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Gas Journal

MARCH, 1958 | Only Magazine Edited Exclusively for the Gas Distribution Industry

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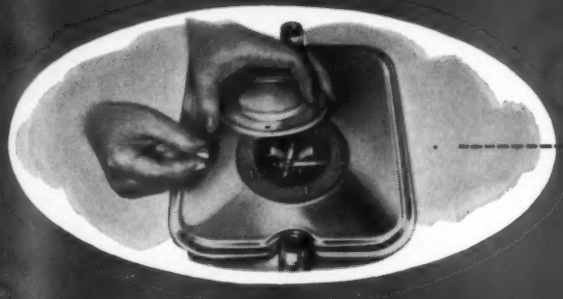
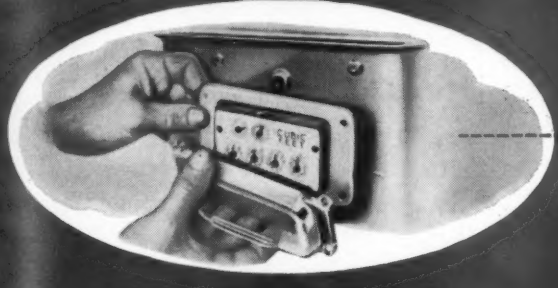
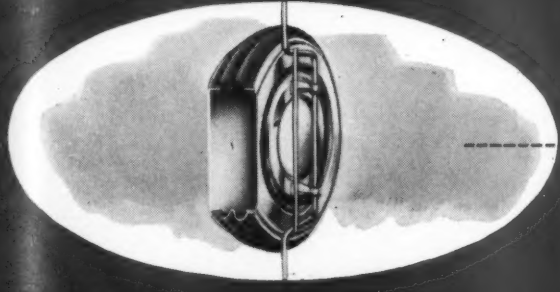


Handcase meter accessibility through easily opened handhole.



Interchangeable index—external and isolated from pressure with gas-tight frictionless rubber grommet drive-shaft seal.



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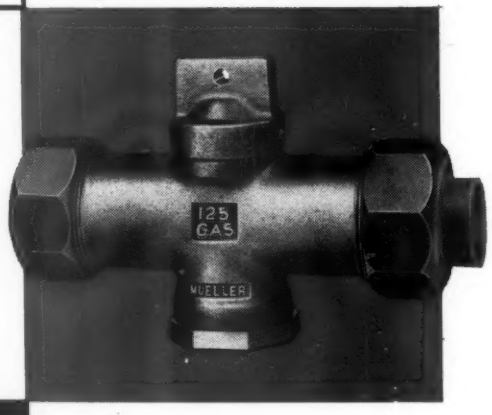

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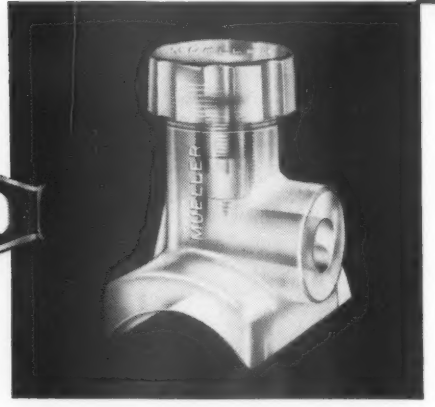

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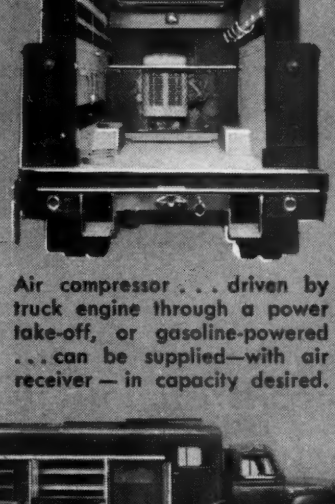

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Fuel for Thought

Supreme Court to Hear Memphis Case Appeal

Gratifyingly, the U. S. Supreme Court, at the urging of the Solicitor General and the FPC, agreed on February 3 to review the *Memphis* decision. In fact, the hearing will involve some unusual procedure for the highest court — four hours have been allowed for presentation of briefs and questioning by the court.

What will happen? Three courses have been suggested by observers: The decision may be reversed, it may be upheld, or the case may be remanded to the Circuit Court of Appeals for rehearing. The gas industry hopes the higher court will reverse this adverse decision. That would solve the complexity of difficulties the case can bring about.

If the case is remanded to the lower court for a rehearing, the industry could well remain in a state of suspension for a long time.

If the lower court decision is upheld, the industry must take other action. This means new legislation. Already industry leaders are laying groundwork for such new legislation — just in case. Depending on the outcome of the Supreme Court review, it is imperative that all hands make preparations to man their battle stations. It certainly will be a battle, too. The struggle for existence will bring forth many both old and new foes of the gas industry — particularly that seemingly unlimited supply of politicians "protecting the consumer interest."

This again brings forth the subject of gas industry unity. Unification of the industry's three segments — producers, transporters, and distributors — into a common alliance working for the benefit of the industry as a whole is needed now more than ever.

The *Memphis* case has certainly made it clear — no segment of the gas industry is immune to political skullduggery.

— *The Editors*

In This Issue

Report on a report. One man who knows the now well-known "Zinder Report" inside out is genial Cliff Brandt, who guided its preparation by H. Zinder and Associates. Credit for the excellent interview with Cliff, beginning on page 20 of this issue, belongs to Southern Gas Association's Managing Director Bob Suttle. He subtly suggested that the best place to get information on what the"Zinder Report" means — and how to use it effectively — would be from the key man himself. Brandt obligingly spent the better part of a day in the AGJ offices, going over the report's finer points and giving us material for a top-flght article for the readers of AGJ. Incidentally, copies of the report are available from AGA, 420 Lexington Avenue, New York 17, New York. Price is $3 for AGA and SGA members, and $5 to non-members. It's one of the best buys you can make — and properly used, will repay its cost many thousands of times over.

Corrosion, it has been roughly estimated, costs the gas distribution industry up to $100,000,000 (or more) each year. Only in recent years has our industry taken proper cognizance of this serious problem. Surprisingly enough, a recent AGJ study on corrosion in the gas distribution industry, brought forth the fact that there hadn't been an authoritative "handbook" published on the subject especially for gas distribution men. That's being corrected. With this issue, we begin a series entitled "Corrosion Notebook" that will, in coming months, provide a complete, thorough, working tool for gas distribution personnel. AGJ's editors are particularly indebted to R. E. Hanna, executive secretary of the Appalachian Underground Short Course at West Virginia University, members of the short course executive committee, and authors of various lectures presented at the short course, for permission to use their lectures as chapters in this series. Other pertinent articles, contributed by outstanding corrosion engineers in the gas industry, will round out the series.

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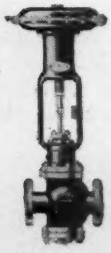
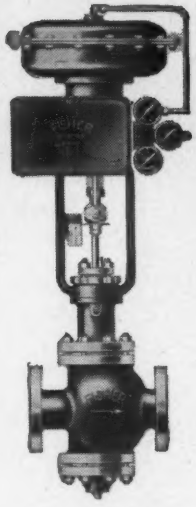
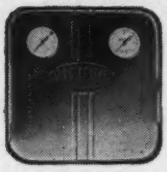




Type 657-A with 3500 Positioner



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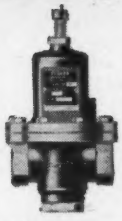
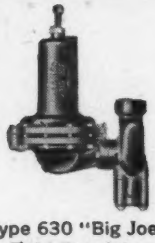


Type 95-H Pressure Reducing Valve



Type 630 "Big Joe" Field Regulator

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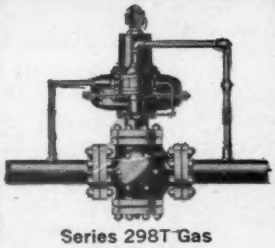
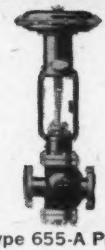


Series 298T Gas Regulators



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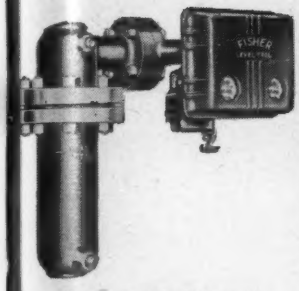

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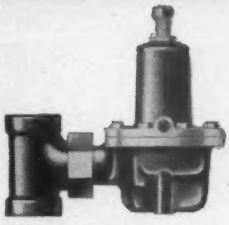

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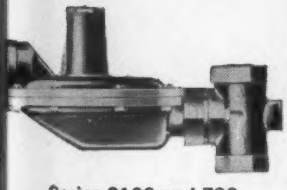

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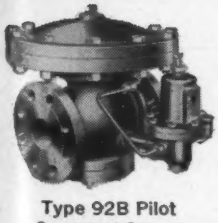

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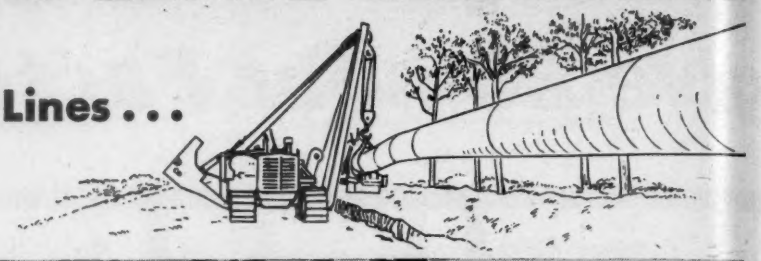

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NEAT, ATTRACTIVE ROCKWELL ALUMINUM METER SETS

The meter set is your company's representative on the customer's property. Meter sets can be in good taste . . . cleanly piped, well located, fabricated with modern components to reflect credit on the quality of your service. Or they can be ugly eye sores.

Do your meter sets compliment the progressive gas industry? Do they match the appearance of the new homes you are serving? Do they belong in contemporary basements or landscaped yards? Rockwell aluminum meter and regulator sets do!

Their eye appealing lines win customer acceptance . . . give the rightful impression of better service and protection from your use of the finest, safest equipment.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Tex. New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

ROCKWELL GAS METERS AND REGULATORS

THE precision with which measurement and control equipment performs depends to a large extent on the dimensional exactitude to which parts and assemblies are controlled.

The high degree of sensitivity and stability in Rockwell meters and

ACCURACY

...that lasts, for the longest life, at the lowest cost

regulators come from the use of advanced design principles, modern materials and many exclusive manufacturing developments.

To maintain accuracy, Rockwell has invested millions in plants and laboratories. Automatic machines, precision tooling and testing take the guesswork out of manufacture. And by grouping the production of related products in separate plants, a closely coordinated measure of quality control is achieved.

The end result is that Rockwell customers get the maximum in accuracy and durability from their measurement and control equipment plus trouble-free performance and low, low maintenance costs. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

FOUR WAYS IN WHICH ROCKWELL EXCELS

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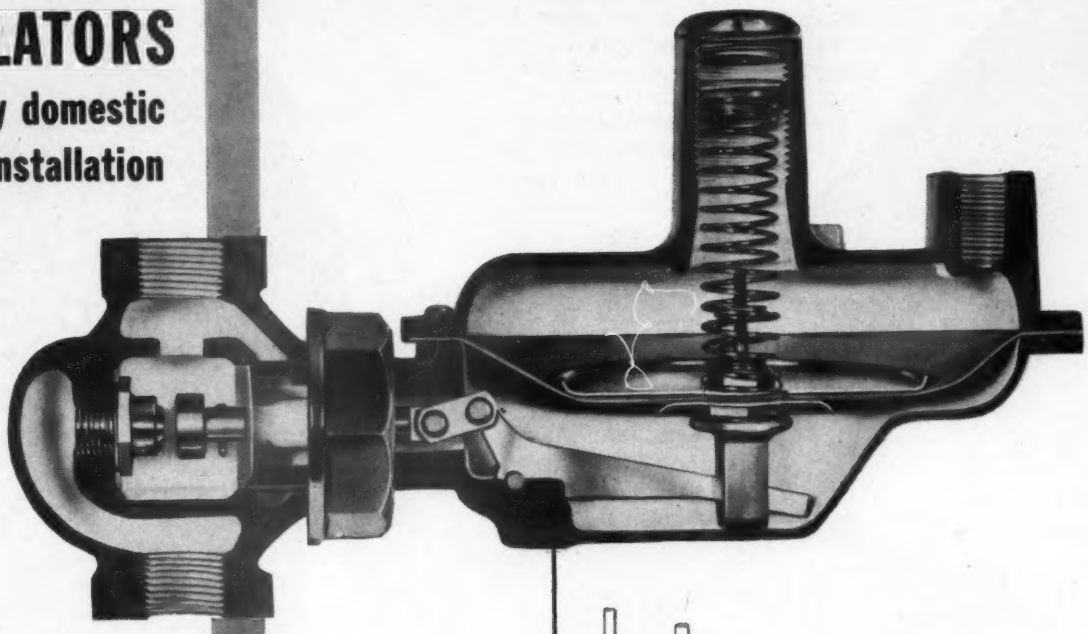
ROCKWELL GAS METERS AND REGULATORS

RELIANCE
Series 1400
REGULATORS
For every domestic service installation

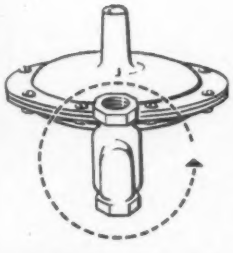
Safe...versatile
Easy to install



Designed for ease and convenience in service regulator installation, inspection and maintenance particularly where space limitations are encountered. Especially suited for difficult pressure elevation jobs.

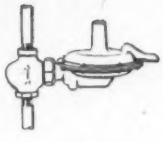
- **Large area passages** from orifice to vent outlet for emergency gas escape under excess pressure.
- **Rugged construction**...high tensile strength cast iron pipe section... durable, light weight aluminum alloy bodies and tops.
- **Choice of safety features**... internal relief, external full capacity relief, mercury seal, automatic shut-off.
- **Detachable meter bar** for compact and convenient installation.
- **Variety of sizes and styles** of vents and vent caps.

MAXIMUM INLET PRESSURE 125 PSI

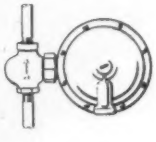


UNION-TYPE removable pipe section installs easily with regulator body swiveled at any angle to pipe—no alignment with the diaphragm section required. Available in a wide variety of models, Reliance Series 1400 and 1500 Regulators embody many exclusive and optional safety features.

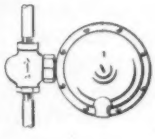
Write today for Bulletin 100



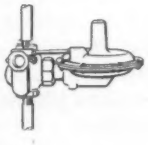
Series 1401—Inverted Vent—screened to prevent entrance of foreign material.



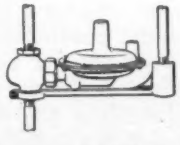
Series 1402—Vertical Diaphragm—large area screened vent prevents water and foreign matter from collecting on diaphragm.



Series 1403—Horizontal Vent.



Series 1444—Mercury Seal—capable of relieving the full capacity of the regulator.



Series 1500—Meter Bar available with 6-inch and 11¼-inch centers. Provides a solid support for the meter.

All Reliance Series 1400 Regulators are designed and manufactured to conform with the requirements of ASA Code B31.1.8—1955.

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METER COMPANY
INCORPORATED (ESTABLISHED 1836)

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SUPPLIERS TO THE GAS INDUSTRY for Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters • American-Westcott Orifice Meters • Instruments • Reliance Regulators • Apparatus • Valves

SIE®

Compressor Start Unit.....

A new Dresser Industries contribution toward a *FULLY AUTOMATIC PIPELINE!*

By installing SIE Compressor Start Units in present, and building, compressor stations, far-sighted pipeline operators are taking advantage of an important short-cut toward full automation of their pipeline systems. Because these units are specifically designed for use with the SIE Compressor Station Computer-Controller and auxiliary automatic control equipment, their installation will *advance the full automation of a gas pipeline by many months* . . . and provide greatly increased compressor station efficiency and equipment protection in the meantime.

As modern pipeline systems are being equipped for completely automatic production scheduling, transferring, and dispatching in the coming months, the Compressor Start Units will be in daily operation . . . *automatically* handling the entire sequence of compressor starting and stopping operations.

Contact the SIE Control Division for full information on the application of automatic control equipment to pipeline operations, and be sure to plan on Compressor Start Unit installations at every station as part of your 1958 equipment program.

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.

P.O. Box 13058 2831 Post Oak Rd. Houston 19, Texas

SIE — ONE OF THE DRESSER INDUSTRIES

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How many gas appliances are in use today? There are nearly 100,000,000, according to an up-to-the-minute report from the AGA Bureau of Statistics, giving preliminary estimates of gas appliances in use as of January 1, 1958 — using natural, mixed, manufactured, and LP-gas. The lineup:

Ranges	32,500,000
Water Heaters	23,000,000
Central Heating Units	9,800,000
Space Heaters	21,600,000
Floor and Wall Furnaces	6,200,000
Refrigerators	3,400,000
Dryers	2,000,000
Incinerators	400,000
Total	98,900,000

First rate increase granted to a natural gas transmission company since the Memphis case decision last November 21 has been approved for Texas Gas Transmission Corporation. Effective January 20, 1958, the increase involves approximately $10,180,000 in additional annual revenues. Some 55 utility customers are affected by the increase, which was necessary to offset higher costs of gas purchased by Texas Gas. All of the rates are final, with the exception of one pipeline customer, which will be collected subject to normal FPC refund procedures.

Wholesale rate increases by four other transmission companies have been allowed under suspension by the FPC since Memphis with the provision that the transmission companies involved file bonds to cover any refunds collected while hearings are underway. Latest orders for "under bond" refund increases were granted to Texas Eastern Transmission Corporation, $11,258,000 annually, and Algonquin Gas Transmission Company, $1,936,000 annually. Previously, the FPC allowed El Paso Natural Gas Company and United Gas Pipeline Company to charge higher rates after filing bonds to cover possible refunds.

New England Gas Association's 32nd annual meeting in Boston, March 20-21, shapes up as a top-flight program for association members. Features include a panorama of the national gas industry on the theme of "Spring," an operating panel on distribution trends and operations, panel discussion on accounting trends, sales symposium, and discussion on utility-public relationships.

Problems of the space age and how they affect the gas industry will be given serious discussion March 31-April 2 in Washington, D. C. at the AGA fourth annual General Management Section Conference. Subjects slated for the meeting of management leaders of the nation's fifth largest industry include nuclear and solar energy, gas air conditioning, future manpower requirements, financial management problems, marketing research, scientific inventory control, and the general economic situation.

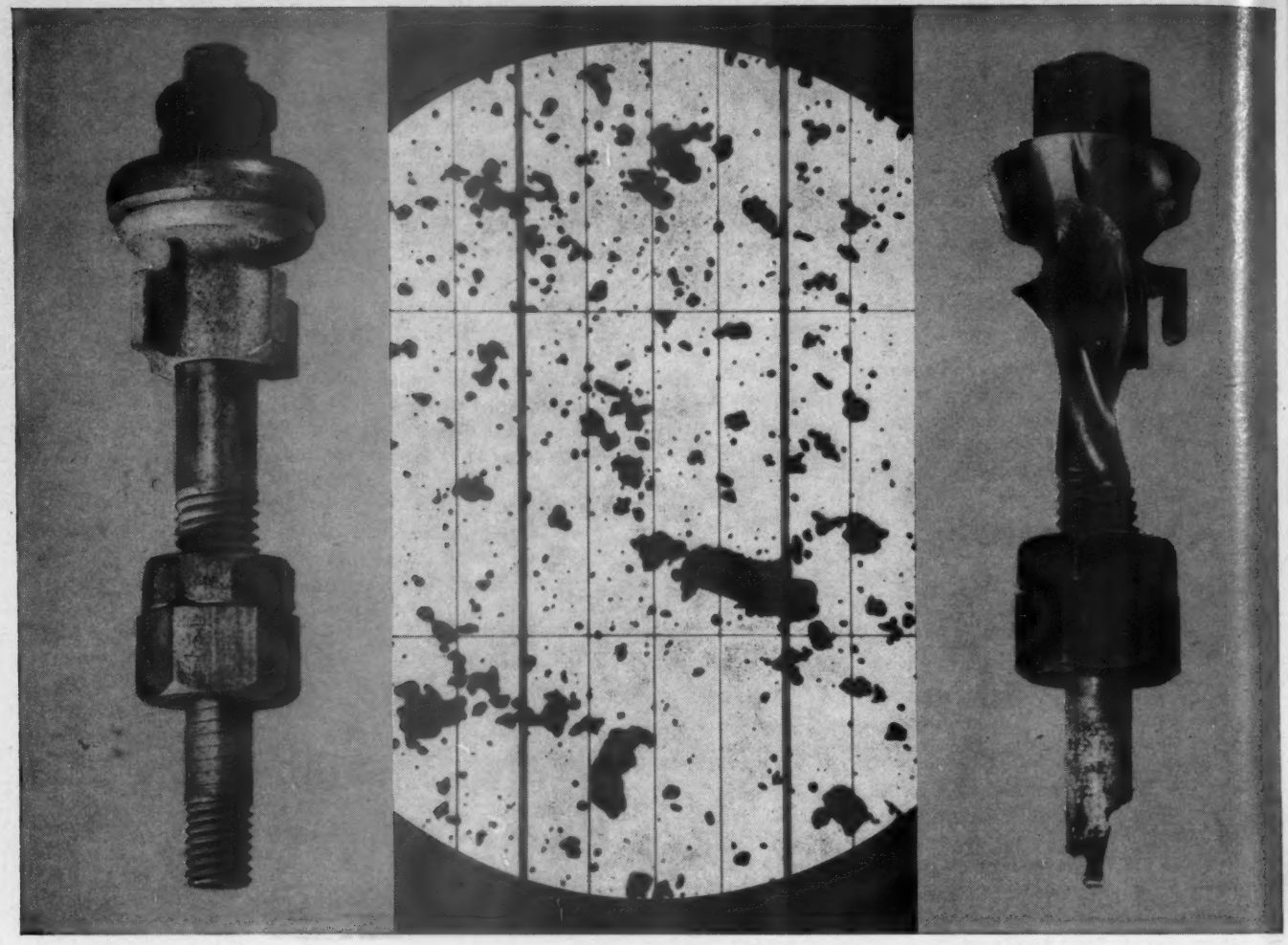
Plastic meters — some 200 of them — have been put into service in eight operating divisions of Southern Counties Gas Company on an experimental basis. The new type meters are produced by Rockwell Manufacturing Company, which is conducting the experiment. The meters will be checked at varying intervals to check effects of weather on the case. Mechanism is same as now used in the Rockwell hardcase meters. Similar experiments with plastic meters are being carried out at three other companies.

Willard Woodrow of Bellflower, California, has been named the recipient of the 1957 Gas Industry Builder Award, given in recognition of his outstanding contributions to the home building industry. The award, first of its kind, was presented at the National Association of Home Builders' convention in Chicago. Woodrow, president of the Aldon Construction Company, has built more than 26,000 homes in Southern California and Arizona since 1945.

Worried Brooklyn residents kept police telephone switchboards busy recently, reporting "strong onion odors." Seems that two gallons of a special odorant used to give natural gas a strong onion odor, leaked out of a container at Brooklyn Union's Greenpoint works. Because of atmospheric conditions, it hugged the ground, causing concern among area residents. They were told it was harmless and would be carried away by winds.

Pipe for construction of the main transmission lines of Houston Texas Gas & Oil and Coastal Transmission Corporation is under shipment. Approximately 150 miles of 24-in. for the 2600-mile system has left the Gadsden, Alabama, rolling mills of Republic Steel Corporation. Final clearance for construction of the line — which will give Florida its first major supply of natural gas — came in December when a U. S. Court of Appeals upheld a favorable ruling by the FPC. The certification had been opposed by a group of Florida fuel oil dealers.

Regulatory Trends. Kentucky's state public service commission has adopted a new policy of tying together rising wholesale prices of natural gas and the rates paid by retail consumers. Kentucky is the 20th state to adopt this method of adjusting gas rates — permitting rates to go up or down, depending on increases or reductions in wholesale prices, without the expense and delay of formal rate cases before the commission . . . **In New York,** a bill has been filed for state legislature action in 1958 that would permit the New York PSC to regulate all public utilities on the same basis as now used for gas and electric companies — using capital actually invested as the rate base, rather than reproduction value . . . **Missouri's Supreme Court** has handed down an opinion having the effect of directing the state PSC to revise its rate-making formula by taking current inflationary trends into consideration in establishing valuations . . . **Discrimination** between towns on their various franchise taxes paid by Arkansas Louisiana Gas Company is being studied by the Arkansas PSC. The PSC noted in a recently adopted resolution that there was great inequality in the amount of taxes levied by the cities, and that in many instances, the amount of tax had no relation to the size of the town, number of customers, or amount of revenue derived from within the city.



This regulator inner valve
designed to control gas pressure with accuracy and dependability

handling gas
with invisible dust that's revealed only by 40 power magnification

blasted by dust
making the regulator inoperative, cutting off the town's gas supply

Blaw-Knox Gas Cleaners end all dust damage

An eroded regulator, a gas leak, a spark, a fire and a town without gas—it all started with gas that proved to be dirty.

This could have been prevented by the oil bath scrubbing action of a Blaw-Knox Gas Cleaner. And it's this fine, invisible dust that travels the easiest, farthest, causes the most damage and complaints. Only oil scrubbing can remove dust particles of small micron and sub-micron proportions. The width of one of the fine lines shown in the photomicrograph is one micron—0.000039 in.

Gas cleaned the Blaw-Knox way provides a trouble-free fuel that cuts your operating cost, and maintains customer satisfaction.

We would be pleased to recommend a Blaw-Knox cleaner to best meet your requirements. Just send us maximum hourly load, minimum pressure at peak and maximum pressure for which the cleaner should be designed.

Send for this book. See how Blaw-Knox Gas Cleaners pay off wherever they're used . . . at the compressor station, town border station or district regulator. Specify Bulletin 2450.

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Buflovak Equipment Division
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see how easily you can
change over units on the new

ROBERTSHAW Unitrol® 1000*

Start with Basic Unitrol 1000 for *manual space heater operation.*

- 100% automatic shut off of pilot and main burner
- A & B gas valves, pilot filter and pilot adjustment

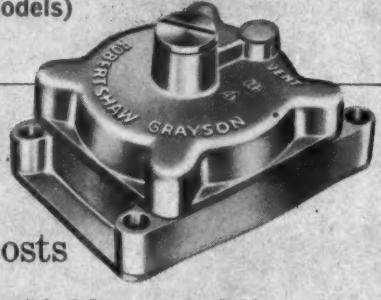
Install any of these hydraulic thermostatic units for automatic *space heater operation.*

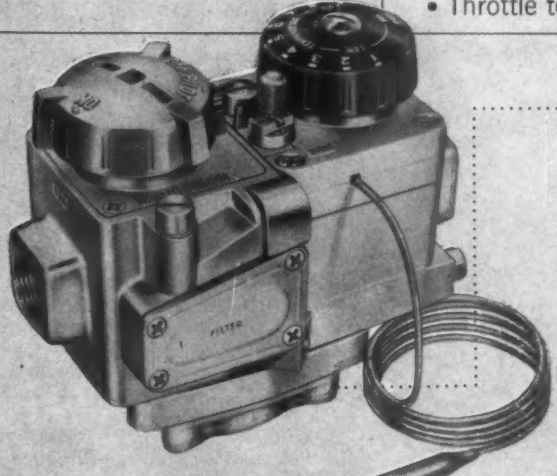
- Snap action, self-contained
- Snap full on
- Snap to bypass
- Snap to high flame—throttle down to bypass—snap off
- Throttle to bypass

or change over to *wall thermostat operation* by installing:

- 24 volt electric unit

Gas pressure regulator improves ignition (optional on all models)





* cuts inventory costs
* standardizes manifold assemblies
* cuts application costs
* saves space—compact
* cuts service costs

* *for space heater applications*

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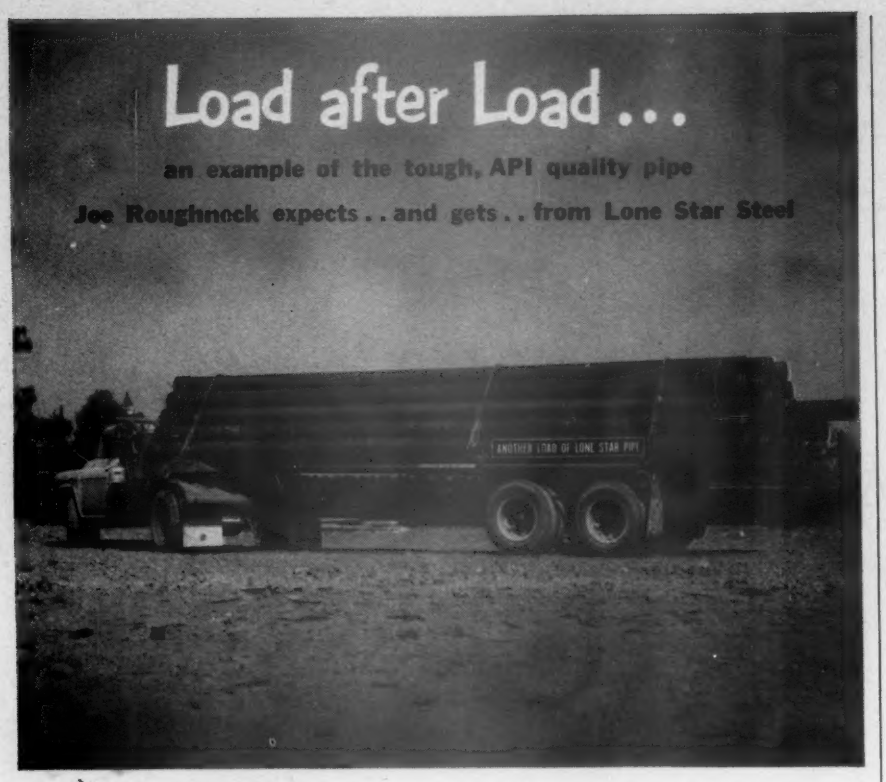
GRAYSON CONTROLS DIVISION • LONG BEACH, CALIFORNIA



In the heart of the oil country, Lone Star Steel's huge plant is Joe Roughneck's solid source of supply for API casing, tubing and line pipe. Quality-controlled from mining of ore to finished pipe . . Lone Star electric weld pipe meets strict API specifications. Fully normalized, of course.

Crossing rivers, bending over hills and rugged terrain is routine for Lone Star line pipe.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.

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Coming Events

IN THE GAS DISTRIBUTION INDUSTRY

March

17-21 National Association of Corrosion Engineers, annual conference, San Francisco, California.

20-21 NEGA, annual meeting, Hotel Statler, Boston, Massachusetts.

24-26 Mid-West Gas Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colorado.

27-28 Oklahoma Utilities Association, annual convention, Biltmore Hotel, Oklahoma City, Oklahoma.

31-April 2 GAMA, annual meeting, Greenbrier, White Sulphur Springs, West Virginia.

April

8-10 AGA sales conference on industrial and commercial gas, Hotel Schroeder, Milwaukee, Wisconsin.

10-11 AGA subcommittee 8 of ASA B31, Greenbrier Hotel, White Sulphur Springs, West Virginia.

14-16 National Conference of Electric and Gas Utility Accountants, Shamrock Hilton Hotel, Houston, Texas.

15-17 Southwestern Gas Measurement Short Course, University of Oklahoma, North Campus, Norman, Oklahoma.

17-18 Indiana Gas Association, annual convention, French Lick-Sheraton Hotel, French Lick, Indiana.

21-23 AGA research and utilization conference, Hotel Carter, Cleveland, Ohio.

28-30 SGA annual convention, Dallas, Texas.

29-30 PCGA distribution conference, Tucson, Arizona.

29-May 1 PIEA-PESA, joint convention, Adolphus Hotel, Dallas, Texas.

May

1 PCGA accident prevention conference, Tucson, Arizona.

4- 7 LPGA annual meeting, Conrad Hilton Hotel, Chicago, Illinois.

4- 7 Air Conditioning & Refrigeration Institute, annual meeting, The Homestead, Hot Springs, Virginia.

5- 9 AGA distribution, production, and transmission conference, The Roosevelt and Commodore Hotels, New York, New York.

5- 9 National Restaurant Association convention and exposition. Navy Pier, Chicago, Illinois (AGA will exhibit).

5- 9 AGA commercial gas school, Edgewater Beach Hotel, Chicago, Illinois.

12 PCGA industrial gas school, Los Angeles, California.

15 NEGA operating division, Sheraton-Biltmore, Providence, Rhode Island.

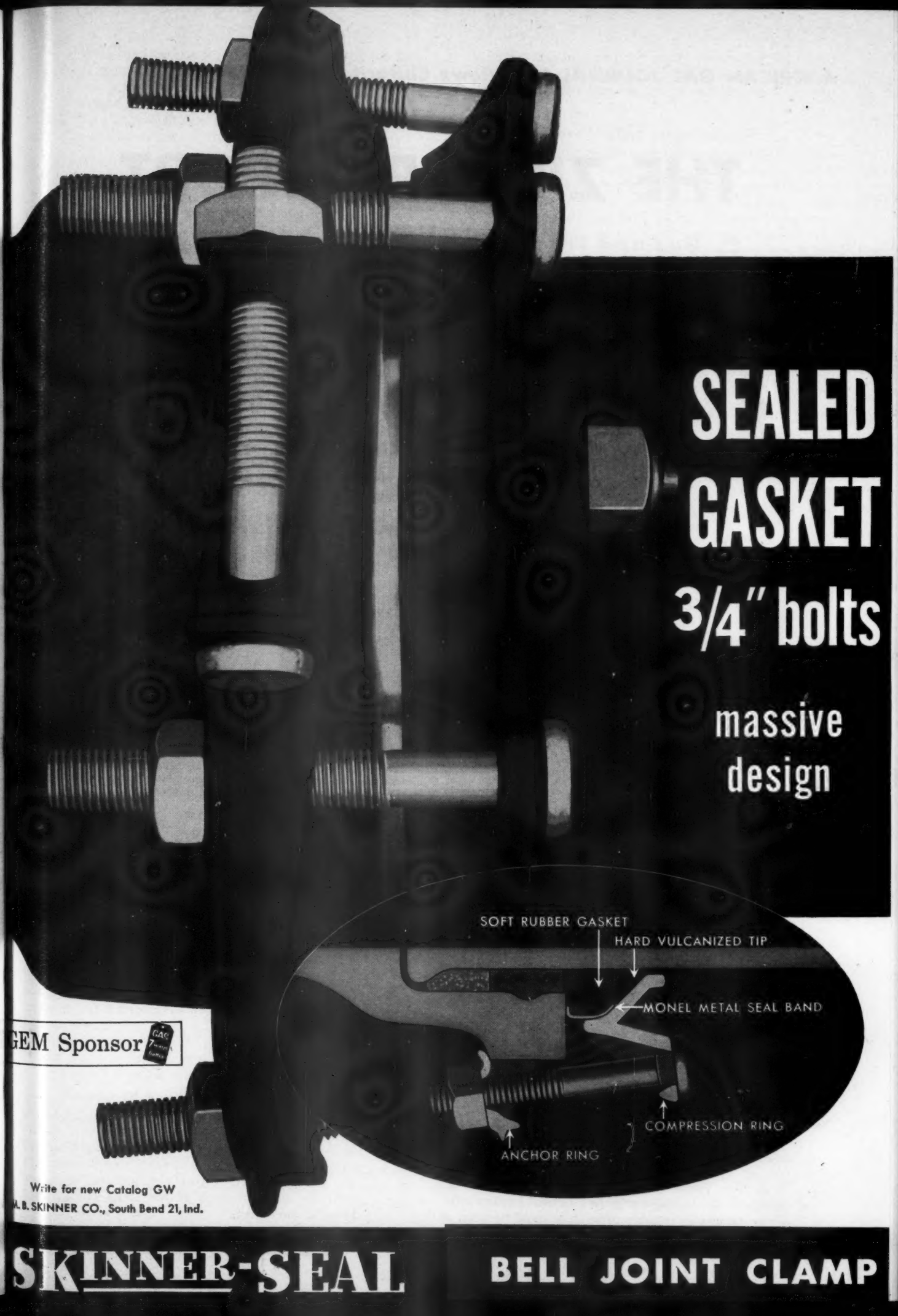
18-21 Industrial Heating Equipment Association, The Homestead, Hot Springs, Virginia.

19-21 AGA mid-west regional gas sales conference, Edgewater Beach Hotel, Chicago, Illinois.

19-23 National Fire Protection Association, annual meeting, Palmer House, Chicago, Illinois.

20-21 PCGA customer service conference, Olympic Hotel, Seattle, Washington.

20-22 Pennsylvania Gas Association, annual meeting, Pocono Manor Inn, Pocono Manor, Pennsylvania.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GASKET
3/4" bolts
massive
design
SOFT RUBBER GASKET
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AMERICAN GAS JOURNAL Interviews Clifford A. Brandt

THE ZINDER REPORT

on Gas and Electric Service in Multiple Housing

. . . at last, a reliable new yardstick for measuring comparative costs of utility services.

. . . makes possible direct and accurate answers to aid the government, communities, builders, and taxpayers, in selection of utility services for public and military housing projects.

. . . here's how this report can best be used by the gas industry.

Clifford A. Brandt began his engineering career in 1927 after graduation from the University of Minnesota with a degree of Bachelor of Science in Electrical Engineering. He joined Northern States Power Company, working as a rate engineer, until 1937 when he was named senior utilities engineer for the City of Minneapolis, Minnesota. On January 1, 1951, he joined H. Zinder and Associates as one of the original associates, where he served as a consulting engineer and assistant vice-president. The "Zinder Report" discussed in this interview was prepared under Mr. Brandt's supervision. On December 1, 1957, he joined Houston Natural Gas Corporation as executive staff engineer.

What is the "Zinder Report" and for whom was it developed?

This 52 page booklet represents the first published study of its kind that presents criteria for determining costs of gas and electric service in military and public housing projects. The basic data, developed usage factors, and specific examples for applying such factors and computing costs, are arranged and cross referenced so as to assist project architects and engineers as well as utility and military personnel in estimating with the greatest accuracy possible, the utility costs of a housing project with any combination of major gas and electric appliances and heating and cooling equipment.

How did the Zinder Report originate and who sponsored it?

It was initiated by the Southern Gas Association after the loss by the gas industry of the entire housing project load to its electric competitor at the Little Rock Air Force Base. This incident revealed the necessity for having authentic and non-controversial usage factors in suitable form that could be used as a guide or rule book to estimate gas and electric consumption and electric demands in future feasibility studies. Because such a study was needed throughout the country, the American Gas Association joined in sponsoring the report and handling its distribution.

How has it been used since completed?

The report was first presented to gas industry leaders and representatives from the Department of Defense early in December. It is hoped that this booklet will be accepted by the Air Force and other branches of the military service for estimating purposes until such time when further operating experience, particularly with air conditioned projects, may modify the usage and demand factors set forth therein.

Where can this report be used and by whom?

The report is so written that it can be applied to any location in the country. If there are valid reasons for estimating higher or lower consumptions for any particular appliance, the estimator should make certain that the ratio of fuel consumption of gas to electricity is maintained at the same energy ratio shown in the report.

While the immediate purpose of the report was to assist the military services, it may also be used in connection with public and private housing projects. Gas appliance salesmen will find considerable material in the booklet which may be used to convince the individual householder of the economy of gas.

Could you name some direct benefits the gas industry can receive by putting the report to work?

The Zinder Report can help the gas industry if it is circulated among the architects and engineers who design the government's housing projects. Gas company sales engineers should study the report and be prepared to work with the project planners in estimating gas and electric consumption and electric billing demands and in pricing such service at the rates applicable thereto.

Different combinations of major appliances may be figured to show that no matter what combination is used, gas will be cheaper than electricity. If there is any location in this country where the presently available gas rate is not competitive with electricity, it might be well for that gas utility to consider making a special rate for master metered service to housing projects which will get the business and still yield a fair return on its investment.

You mentioned usage factors. What are they for cooking and heating?

Based on the data which was assembled, the average monthly usage factors for cooking and water heating in a two bedroom housing unit were developed as follows:

	Public	Military
Gas cooking	9.6 therms	10.5 therms
Electric cooking . . .	135.0 kwh	148.0 kwh
Gas water heating . . .	20.0 therms	21.9 therms
Electric water heating . .	352.0 kwh	387.0 kwh

As explained in the report, the higher usage in military projects was attributed to higher incomes and standards of living, greater saturation of automatic washing machines and other modern appliances, and a greater number of small children per family.

The above usage factors include project distribution losses as the basic data was obtained from the readings of master meters that measured the entire consumption of each project.

With one kwh being equal to 3413 Btu and a therm being 100,000 Btu, the energy ratios based on the above usage factors are 2.08 for cooking and 1.66 for water heating. Published reports on laboratory tests of gas and electric cooking equipment generally show gas to electric energy ratios of 2 to 1 and for storage-type water heaters of about 1.6 to 1.

What about usage factors for refrigerators?

The report points out that in public housing projects there are thousands of gas refrigerators in use. At the time the report was being prepared there was some doubt as to the continued production of this appliance and for that reason it was not considered in the all-gas plan. The report shows that the average gas consumption would be 14.3 therms per month as compared with 40 kwh per month for the electric box in a two bedroom unit.

Clothes drying usage factors?

Usage factors for gas and electric clothes dryers were taken from special studies as no such data was available in housing project statistics. For identical loads, the gas dryer used 3.7 therms as against 97 kwh used by the electric; the energy ratio being 1.12 to 1. If the electric consumption of the motor used in the gas dryer is included, the energy ratio is only increased to 1.18 to 1. The gas industry ought to take full opportunity of this tremendous advantage in fuel consumption.

What about space heating usage factors?

The volume of gas used for space heating purposes is determined by using a factor which is taken from a curve shown in the report. All that is required is the hourly Btu heat loss per dwelling unit and the annual number of degree days in the location being considered. In the example used in the report with a 45,000 Btu heat loss and 3500 degree days, the factor taken from the consumption curve was .21 therm per degree day or 467 Btu per degree day per 1000 Btu of heat loss.

Consumption of the air to air electric heat pump was estimated on the basis of an analysis of the Edison Electric Institute's study of actual heat pump installations throughout the country. The developed factor was .05 kwh or 171 Btu per degree day for each 1000 Btu heat loss.

The limited number of examples contained in the December 1956 Edison study furnished no basis for estimating a different factor for different climates.

Section 16 of the Zinder Report discusses the electric heat pump, including a detailed analysis of the "Heat Pump Data Sheets" published by the Edison Electric Institute in the study referred to above. The average computed overall performance factor during the heating cycle for all the units analyzed was 2.26.

. . . the gas industry should get the report into the hands of the men who design housing projects and make recommendations as to kind of fuel and equipment to be used.

. . . the gas industry lost the entire housing project load at Little Rock Air Force Base to its electric competitor — establishing the need for authentic and non-controversial usage factors for future feasibility studies.

This is also known as the coefficient of performance, which the electric proponents usually assume is around 3.0.

This analysis also indicated that the non-coincidental electric demand during the heating cycle averaged .216 kw for each 1000 Btu heat loss. In the Zinder Report this was rounded to .2 kw and a coincidence factor of 70 percent was applied in arriving at a coincidental demand for billing purpose of .14 kw per 1000 Btu heat loss in each month of the heating season.

This takes us to summer cooling. What was developed in this respect?

Because of the lack of data on actual operating experiences with different types of cooling equipment, it was necessary to resort to the input and output ratings published by the various manufacturers to develop the usage factors required for estimating gas and electric consumption of such equipment.

For the absorption-type gas air conditioning unit, it is necessary to know the actual output in Btu per hour. If the heat gain of the dwelling unit is less than the output rating of the unit selected, the running time will be less than the actual number of required cooling hours. Knowing the Btu input and the required running time, the total volume of gas can be determined. With a heat gain of 30,000 Btu per hour per dwelling unit in a location where air conditioning is required for 1000 hours each season, the gas usage factor was 1907 Btu per hour for each 1000 Btu of heat gain.

Consumption factors were determined in the same manner for the electric cooling equipment, the electric usage factor being 489 Btu per hour for each 1000 Btu of heat gain for the particular heat pump selected.

In most areas of the country where summer cooling is required, the Btu heat loss is generally in excess of the Btu heat gain. **This means that if an electric heat pump is to perform both functions, it will generally be oversized for the cooling load.** From an operating standpoint, the conventional electric air conditioning unit that can be more properly sized for the cooling load will be more economical to run, because of the lower kwh consumption and lower demand, than the electric heat pump which has to be large enough to take care of the higher winter load.

What are the break-even rates for gas and electricity?

On the basis of the usage factors developed in the particular demonstration problems used in the report, it was a simple matter to compute the average rates for gas and electricity which would result in equal annual operating costs under each of any two plans being compared. For any given electric rate the equivalent gas rate can be determined by the use of the accompanying chart.

For instance, when comparing the all-gas plan (Plan A) with the all-electric plan (Plan C) and it is assumed that the average electric rate (including the demand charge) is 1 cent per kwh, the annual cost of both plans will be the same if the gas rate is just under 10 cents per therm. With electricity at 1.5 cents per kwh, the equivalent gas rate is 15 cents per therm.

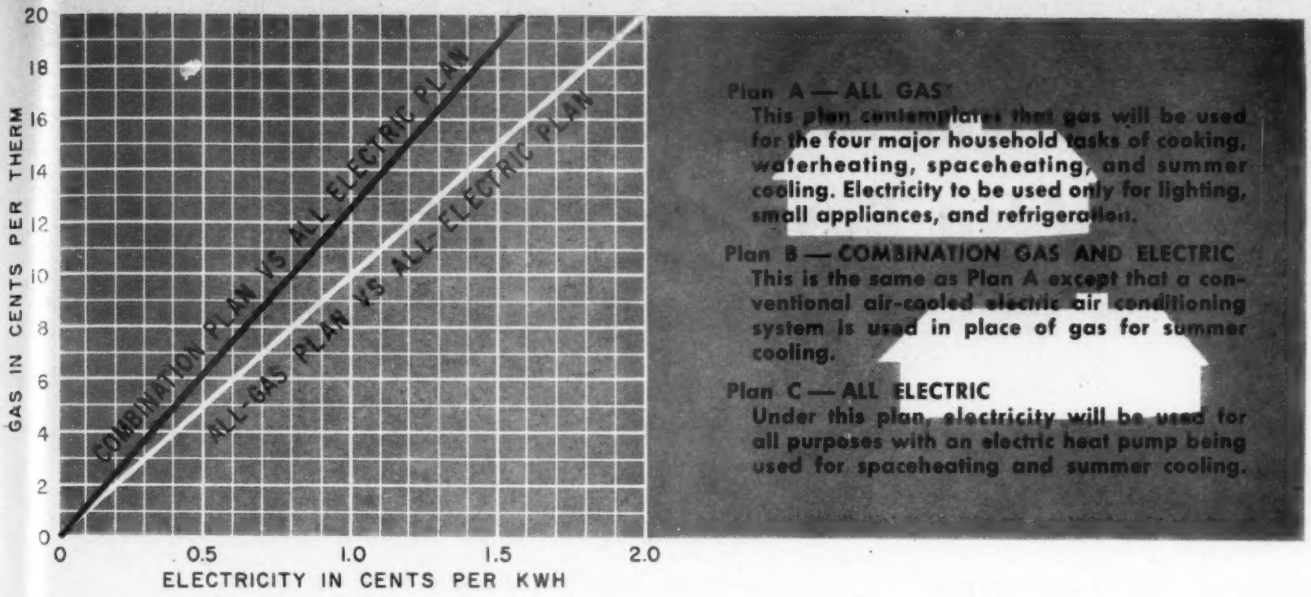
Under the combination plan (Plan B) where gas is used for cooking, water heating, and space heating, and a conventional air-cooled electric air conditioning system is to be used in place of the gas absorption cooling system, the comparison of break-even rates with the all-electric plan is similarly shown in the chart. With a 1 cent electric rate the equivalent gas rate would be 12.5 cents per therm.

From the tables of cost computations for 35 cities shown in the report[1] it is apparent that there are practically no areas outside of the subsized TVA territory where electric rates of less than 1 cent per kwh are available for this type of service. On the other hand there are very few places where gas rates of under 10 cents per therm are not in effect.

There is no doubt about gas having the advantage over electricity on a cost basis in practically every section of the country. Even in TVA cities the presently effective gas rates for this type of business result in lower operating costs than with government electricity.

For the many areas where gas rates are less than 10 cents per therm, the lowest shown in the report being only 2 cents per therm, it would be economically un-

[1]In computing gas and electric costs shown in Tables 2A and 2B of the report, it was assumed that the housing project would be metered through the same facilities used in measuring the consumption of an existing military base and that the housing project would receive the benefit of the lower rates, if any, applicable to consumptions in excess of those used by the regular base. The base gas load was assumed to be 1000 Mcf (10,000 therms) per month. The base electric consumption was estimated at 200,000 kwh per month at primary voltage and 85 percent power factor. The electric demand was estimated at 8000 kw for a load factor of 34.2 percent.


GAS IN CENTS PER THERM
ELECTRICITY IN CENTS PER KWH
COMBINATION PLAN VS ALL ELECTRIC PLAN
ALL-GAS PLAN VS ALL-ELECTRIC PLAN
Plan A — ALL GAS
This plan contemplates that gas will be used for the four major household tasks of cooking, waterheating, spaceheating, and summer cooling. Electricity to be used only for lighting, small appliances, and refrigeration.
Plan B — COMBINATION GAS AND ELECTRIC
This is the same as Plan A except that a conventional air-cooled electric air conditioning system is used in place of gas for summer cooling.
Plan C — ALL ELECTRIC
Under this plan, electricity will be used for all purposes with an electric heat pump being used for spaceheating and summer cooling.

sound to use any fuel other than gas for the *major* utility services in multiple housing units.

How does the Zinder Report treat monthly variations in consumption?

For the man who is interested in gas heating and non-heating consumption statistics, the Zinder Report includes a table that shows how gas used for non-heating purposes varies from month to month throughout the year. This table definitely shows that the so-called base cooking and water heating load indicated by gas consumption during the summer months is not the same throughout the year. Gas heating sales to residential customers may be more accurately estimated if the deduction of the cooking and water heating load is made with the aid of the monthly usage factors shown in the report.

Another table is included that shows the monthly variation in electric consumption for lighting, small appliances, and refrigeration which is based on a study of housing project records covering the use of more than 38,000,000 kwh for such purposes. A similar table shows the variation from month to month in the use of electricity for lighting and small appliances only.

Why is a knowledge of the "electric demand factors" so important?

The maximum demand of a housing project is very important because electricity for such projects is always purchased at rates that include a demand charge and this demand charge may amount to as much as one-third or more of the total electric bill.

It is very easy to estimate demands by making all kinds of assumptions and guesses as to coincidence factors, load factors, living habits of people, and demands of individual appliances. The best measure, however, of coincidental peak demands for billing purposes are actual recorded demands.

Electric demand factors applicable to lighting and small appliances, refrigerators, ranges, and water heaters as developed in the report are all backed up by billing demands secured from the records of the housing projects surveyed for this study.

The following figures are taken from one of the tables in the report and show how the average monthly coincidental demand for a two bedroom military dwelling unit is attributed to each major appliance.

	Average kwh per Month	Average kw billing Demand
Lighting, small appliances, administrative uses and project losses	115	.374
Refrigerator	40	.049
Range	148	.654
Water Heater	387	.655
Total	690	1.732

For projects where electricity may be considered for heating and cooling, the report shows how the average monthly coincidental or billing demand is determined to reflect such additional equipment.

The report also points out that where a housing project is to be built adjacent to or on an existing military installation or base, the additional energy requirements may be purchased through the master meters presently servicing the main base. In such instances it is necessary to secure electric load curves of the base load from the proper authorities to see how the load pattern of the proposed housing project compares with the base load.

Typical load curves shown in the Zinder Report will be of assistance in this matter. Credit for any obvious diversity between the peak demands of the base load and the housing load should be given the housing project in estimating billing demands; however, it will generally be found — particularly in the case of all-electric housing projects — that the peak demands of housing facilities will follow very closely the peak demands of the main base.

How would you sum up ways and means for the gas industry to derive the greatest benefit from the Zinder Report?

The gas industry should benefit from the Zinder Report if the following steps are taken:

1. Get the report into the hands of the men who design housing projects and make recommendations as to the kind of fuel and equipment to be used.

2. Become familiar with the report and assist project planners whenever possible in preparing estimates of fuel consumption, electric demands, and annual operating costs.

3. Obtain additional field data to check the factors in the Zinder Report and to reinforce by proved facts the gas industry's economic advantage over other fuels.

* * *

Frosting on the Cake . . .

Are You Overlooking *Hidden Revenue Dollars* In Gas Air Conditioning Load?

Donald M. Mayne
Marketing Consultant — Gas Air Conditioning
Dallas, Texas

Indirect benefits — in revenue-less-cost-of-gas resulting from improved load factor (and its attendant lowering of demand cost) — can help increase your company's earning rates

THERE IS FROSTING ON THE CAKE; it's a **"plus feature"** frequently overlooked by the gas industry in its appraisal of the values of gas air conditioning. The increase in "revenue less cost-of-gas" resulting from load factor improvement can amount to important dollars.

Direct benefits to the gas distribution companies resulting from the sale of gas for summer air conditioning have been explored and publicized extensively. Increased net income as gas air conditioning is added to the lines makes an impressive picture.

Reasonably attainable sales objectives have been projected by one utility to demonstrate the opportunity to increase its earning rate by more than 2 percent in 10 years. In another case it has been shown that cost-of-gas increase of ½ cent per Mcf per year could be absorbed; and in another, that summer losses could be importantly reduced or completely neutralized. A truly fine, profitable load by any measure.

But, none of these analyses consider the **"plus feature,"** the frosting on the cake.

Millions of dollars have been and are currently being invested to develop gas storage facilities, an important feature of which is their influence on the load factor problem. Special "interruptible clause" contracts are being written with large users at borderline profit or in some cases actual "loss" rates. These too, are born of the urgency of the load factor problem.

Gas air conditioning, while not an immediate or complete panacea for all attendant ills of poor load factor, is one of the most logical, profitable, and sound means of alleviating the severity of poor load factor results.

Can Lower Gas Cost

Most gas purchased from transmission companies is on a demand-commodity basis. The overall cost of gas per Mcf increases with low load factor and decreases with a high load factor. In turn, many transmission companies purchase from the producer on contracts having "take-or-pay" provisions based on a minimum daily delivery. Tangible improvement in load factor at the gas distributing level then will improve the gas purchasing position of both the distribution and transmission companies. Let's look at these "cost-of-gas" considerations.

Many of the gas distribution company cost-of-gas formulas follow this general form:

$$\text{Cost-of-gas} = \frac{3.288 \times \text{Demand Cost}}{\text{Load Factor}} + \text{Commodity Charge}$$

The commodity charge is constant for any given contract. The term "3.288 x demand cost" relates to certain fixed charges of the supplier and are determined in accordance with certain rate making provisions as approved by the Federal Power Commission. "Load factor" relates to the annual purchase pattern of the utility and is, "average daily use divided by maximum daily use."

Thus, any increment of increase in average daily use without changing the maximum daily use will result in an increase in load factor and a decrease in the demand cost.

Any example of the application of this formula may not apply accurately to a specific utility company due to variables relating to both the supplier and the utility. Factors used in the following example are generally representative of the sales contracts to utility customers of one large gas transmission company. The dollars-per-year-per-ton results correspond closely to those recently developed by one gas utility company in studying this matter.

How it Works

Yourtown Gas Company buys its gas from *Great Southwest Gas Transmission Company*. *Yourtown* uses nearly 15 billion cu ft per year. The purchase contract formula (simplified) with *Great Southwest* for the contract year ending December 31, 1958, is:

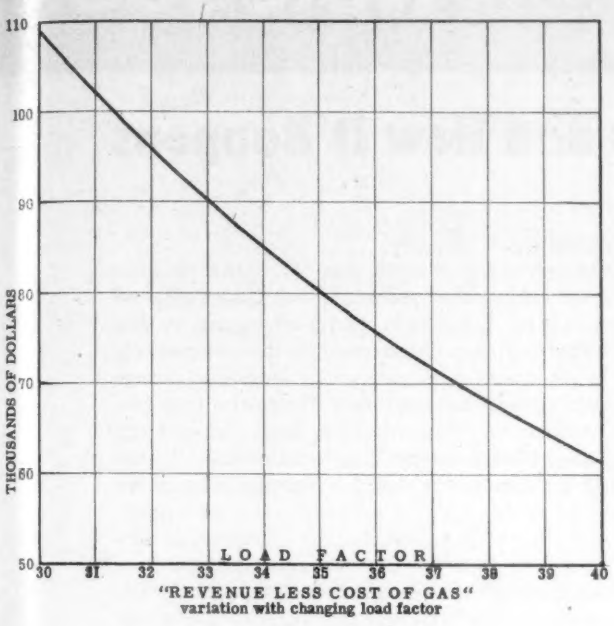
$$\text{Cost-of-gas} = \frac{6.6}{\text{L.F.}} + 0.178$$

During calendar year 1957, *Yourtown* purchased 14,892,000 Mcf, an average daily use of 40,800 Mcf. Last January 23, a peak day of 120,000 Mcf was established to produce a load factor of 34.0. Applying these values in the formula results in a cost-of-gas of $0.372,117,66 per Mcf.

If, somehow, *Yourtown* could have used a daily average of 42,000 Mcf without increasing the January 23 maximum, then the load factor would have been 35 percent. The overall cost-of-gas for 1958 would be at the rate of $0.366,571,43 per Mcf. This reduction of $0.005,546,23 — when applied to total annual purchases — amounts to $82,582.01.

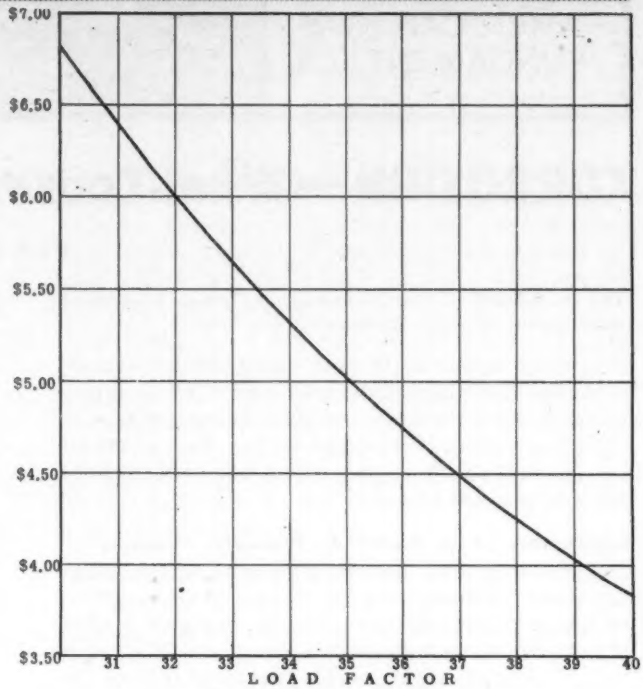
Similarly, if the load factor were one point lower, the cost-of-gas would increase $87,609.64. Projecting these findings through a load factor range from 30 to 40 results in the curve plotted in Fig. 1. Increases or decreases in purchase price have been inverted to indicate the effect of "revenue less cost-of-gas."

Yourtown serves an area having a normal cooling season of 1200 hours. One ton of cooling with an absorption unit will use 27,360 cu ft of 1000 Btu natural gas per season. This increases



"REVENUE LESS COST OF GAS"
variation with changing load factor

FIG. 1.



"REVENUE LESS COST OF GAS"
increase per ton of air conditioning added

FIG. 2.

the average daily use by 75 cu ft. Assuming that this air conditioning customer is already using gas central heating, then no increase will result in maximum daily requirements and the entire gas consumption will apply to improve the load factor.

An increase of 1200 Mcf in average daily use results in a one point improvement in load factor. Thus, the gas consumed by adding 16,000 tons (1200/.075) of air conditioning to the lines would increase the load factor one point and add $82,582.01 to the annual "revenue less cost-of-gas." This is an increase of $5.1615 per year per ton. This value varies according to the load factor range to which it is applied. The values have been plotted on Fig. 2.

This $5.1615 per-ton-per-year increase in "revenue less cost-of-gas" is the "plus feature" of gas air conditioning. If *Yourtown Gas Company* sold an average of four tons to each of one percent of its 87,000 customers, it would realize a total annual increase resulting from improvement in gas purchasing advantage equal to more than $17,962 per year.

This is in addition to the direct increase in net income resulting from sale of the gas used by these units.

What about the new customer, one who is not now using gas for heating? One such new customer in *Yourtown* uses 95,760 cu ft per season for 3½-tons of summer cooling load, and an additional 135,000 cu ft per season for heating. The average daily use is increased by 632 cu ft and the maximum day by 1600 cu ft.

Adding these to the comparable total amounts and running them through the calculator reveals that there is a slight improvement in the load factor in spite of the increase in maximum day consumption. "Revenue less cost-of-gas" increases $5.21 due to the load factor improvement; a rate of about $1.50 per year per ton.

Had this new customer not been sold on summer gas air conditioning and put in gas central heating only, then "revenue less cost-of-gas" would decrease $23.23 per year, reflecting the adverse effect of this new customer on Yourtown's load factor.

It can likewise be shown that a new large commercial or industrial customer—who installs both heating and cooling — will produce an increase in "revenue less cost-of-gas" in spite of the added maximum day consumption. The numerical results will normally be greater per ton than with the residential customer due to the characteristically high internal cooling load that has the effect of increasing the ratio of daily average to maximum day consumption.

Some utility companies have taken a less than enthusiastic view toward air conditioning for large industrial customers on the premise that the interruptible contracts were so near "cost-pricing" that little if any values resulted from this increased utilization.

Considered in the light of this "plus feature" a new 1000-ton gas-actuated industrial air conditioning job would show an increase in "revenue less cost-of-gas" of $5,161.50 per year. This is in addition to any gross income resulting from mark-up on gas cost, regardless of how small this mark-up might be. Even at cost-pricing then, this business too can have direct tangible value to *Yourtown Gas Company*.

The opportunity to improve load factor through new year-around air conditioning load should, as a long range program, have even greater interest to the transmission companies than does the load factor improvement feature of gas storage.

Considered only in the light of this feature, gas storage is a sedative that makes the pain more bearable, while new summer air conditioning load is curative.

Air conditioning will add strength to the industry's position by adding new profitable load with excellent load factor while concurrently securing the future of the vast heating load which storage helps to satisfy. "Take or pay" gas becomes less of a problem to the transmission company. The utility that has no immediate adequate storage opportunity will realize increased "revenue less cost-of-gas" as a "plus feature" in addition to the basic net income from air conditioning load.

Yes, there is frosting on the cake—air conditioned frosting—and it should whet the appetites of the entire industry —producer, transmission company and distribution company. ★ ★ ★

CORROSION — What Causes It and How It Happens

Part 1

W. A. Koehler, *Head, Department of Chemical Engineering West Virginia University, Morgantown, West Virginia*

In order to attack the problem of checking corrosion effectively, it is necessary to understand what corrosion is, what causes it, and what changes take place during corrosion. If we diagnose the cause of corrosion properly, we have gone a long way toward knowing what remedy to apply.

Corrosion is a Natural, Normal Process

A gas man, after a hard day's work fighting with corrosion problems, may be inclined to philosophize on the perversity of nature. Nature, however, is only acting normally when she corrodes pipes. When iron rusts, it changes to iron oxide. That is what it was as it lay in its ore bed before man disturbed it; that is its state of equilibrium. If we were to attribute animal feelings to the iron in the ore, we might say it is satisfied, comfortable, doesn't want to be disturbed. It has been lying there unchanged for perhaps millions of years, and never felt better. Along comes man, digs it up, mixes it with coke and limestone, subjects it to terrific heat and robs the iron of its oxygen with which it has been associated satisfactorily for so long. It is now iron or steel. Can we blame it if it tries to go back to its natural equilibrium state, iron oxide? It attempts to start on this road immediately, and nature, from man's point of view, is provocatively accommodating. It is always ready to supply two important accessories: Moisture and oxygen. Neither one alone can do much, but with the two together, watch out!

ELECTROCHEMICAL THEORY OF CORROSION

We now feel quite certain that corrosion of metals is an electrochemical process. Michael Faraday laid the ground work for the theory; in 1824, Sir Humphrey Davy applied cathodic protection based on Faraday's theories; in 1903, Dr. Willis Rodney Whitney developed our modern theory as we know it today. Because of these men and others who gathered facts **and then did some thinking,** we are able to attack corrosion problems more effectively.

Electrochemistry of Corrosion is Simple

Fortunately, we need to know very little about chemistry to understand the electrochemical changes taking place when a metal corrodes. First, there is the metal. It is generally hard, firm, dense, opaque, insoluble in water, and it conducts electricity. But metals can also exist as ions. The metal ions are soluble in water; their color, if any, has no relation to the color of the metal; they are charged positively, whereas the metal is neutral; they help to carry an electric current through a solution.

The electrochemistry of corrosion deals with the change of metals to ions, and of ions to metals or gases. When a metal changes to ions, that is corrosion. It is that simple.

Electrochemical Theory

Let me introduce the electron. It is the smallest particle of matter that exists; it has essentially no weight but it has a negative charge of electricity and that is important. It is represented by the letter **e.** It is found in all atoms; it is part of all atoms. It cannot exist alone. No one has ever seen an electron or a bottle full of electrons. When an atom loses one or more electrons, it becomes an ion. This is represented by the following equation in which Fe represents an atom of iron:

$$Fe - 2e = Fe^{++} \quad . \quad . \quad . \quad . \quad . \quad (1)$$

The Fe^{++} is an iron ore. The iron atom lost two electrons, lost essentially no weight, but the change in the properties of the ion from those of the atom is tremendous. Some of these differences were enumerated above. Equation 1 is the basic corrosion process when iron rusts; similar equations apply to other metals. But the change represented by Equation 1 cannot take place alone. This brings up the subject of electrolytic cells.

Electrolytic Cells

Whenever two metals (or a metal and carbon or graphite) are immersed in water, a voltage is set up between the two metals, unless the metals are absolutely alike or the water is absolutely pure. If the water has some salt or acid dissolved in it, the voltage is greater. If the two metals are quite different, that, too, makes for greater voltage. A zinc-steel combination gives a greater voltage than a cast iron-steel combination. This voltage is a mysterious, but important force supplied by nature, and we cannot do anything about it any more than we can do anything about the force of gravity.

This combination of two metals, called electrodes, dipped into a conducting solution, called an electrolyte, constitutes an electrolyte cell. If the cell produces a voltage spontaneously, it is called a voltaic cell or a galvanic cell. Flashlight cells, hearing-aid cells, photoflash cells and the No. 6 dry cells are all examples of voltaic cells.

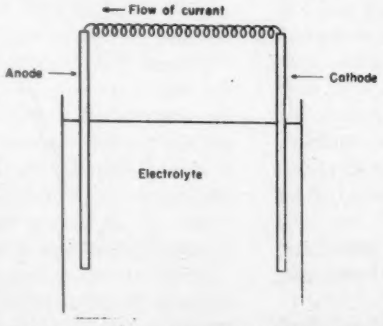


FIG. 1. A simple electrolytic cell.

If the two electrodes are connected by a wire, a current will flow through the circuit passing along the wire, into the cell through one electrode, called the anode, through the electrolyte; and out of the solution through the other electrode, called the cathode, and back into the wire. (See Fig. 1.)

The subject of voltaic cells especially concerns us in corrosion studies.

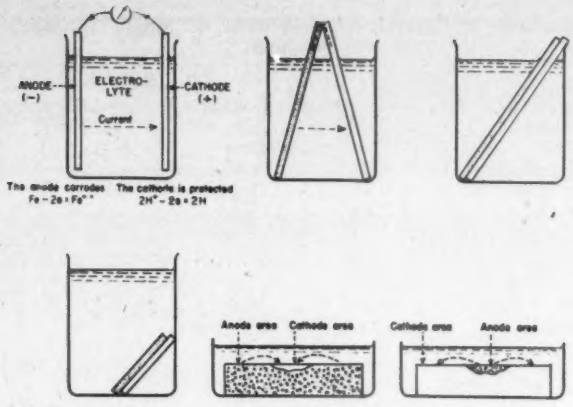


FIG. 2. Examples of anode-cathode arrangements in electrolytic cells.

There are a few fundamentals regarding electrolytic cells that we need to remember. When a current flows through a cell, there is **always** some chemical change taking place at the contact between the anode and the electrolyte and at the contact between the cathode and the electrolyte. These chemical changes can be of far-reaching importance in corrosion control.

In many cases (but not all) the anode wastes away; it forms ions; that is, it corrodes. If the anode is made of iron or carbon steel, that is practically always the case. If, however, the anode is made of carbon or of platinum, it does not corrode. The cathode, on the other hand, is usually unaffected by the chemical change taking place at its surface. This change usually consists of evolution of hydrogen on the cathode or its plating with a metal, neither of which is apt to hurt the cathode, particularly if it consists of iron or steel.

Voltaic cells need not consist of two separated electrodes immersed in an electrolyte. Fig. 2 shows some combinations that are all electrochemically identical with the cell shown in Fig. 1. However, we cannot obtain useful current from them because the two electrodes are in direct contact. They are short circuited, but the chemical actions go on just the same and a current flows from the anode through the electrolyte, to the cathode and then directly through the metal to the anode again.

Beware of Plus (+) and Minus (−) Signs

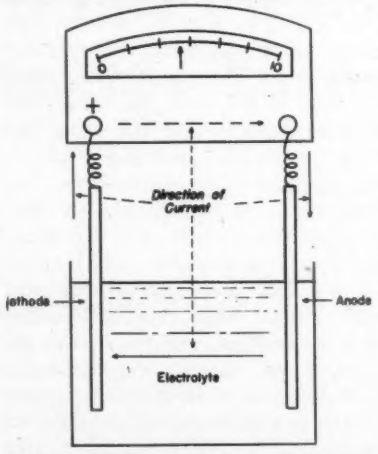


FIG. 3. In all d-c meters, current enters meter at positive terminal. This gives answer to direction of current.

In all cells, electrodes can be properly labelled plus and minus. To many persons these signs are tricky. In some cases, the anode is negative and the cathode is positive, in other cases it is just the reverse. There are rules that tell us which is which but you may not remember the rules, or you may not be sure which rule to apply.

We will use the terms **anode** and **cathode,** and forget about the signs; then there can be no confusion. The current flows from anode to cathode **in the electrolyte,** always, in all cells, under all conditions.

The plus sign is placed on or near one of the terminals of all direct current voltmeters, millivoltmeters, ammeters, and milliameters. The current always enters the meter at the positive terminal and leaves it at the other terminal, which may or may not be marked with a negative sign. This gives a direct answer to the direction of the current in a circuit. (See Fig. 3.)

BASIC CORROSION REACTIONS

When iron or steel corrodes, there is always an anode and a cathode, an electrolyte and a return circuit. The corroding reaction at the anode, and the reaction at the cathode are:

At the anode $Fe - 2e = Fe^{++}$ . . . . . (1)
At the cathode $2H^{+} + 2e = 2H$ . . . . . (2)

The anode reaction has already been discussed. In the cathode reaction the H^{+} represents a hydrogen ion; the H, hydrogen gas. A drop of ordinary tap water contains 3 million million hydrogen ions so there is no need to wonder where the hydrogen ions come from if moisture is present.

What is the Electrolyte in Corrosion?

An acid or a salt solution makes a good electrolyte and corrosion in such solutions is rapid. But ordinary tap water or river water is sufficiently conductive to permit corrosion reactions to take place. Even rain water, as it falls through the atmosphere, dissolves sufficient carbon dioxide to make it conductive, and in industrial areas or near the sea shore, it may dissolve a variety of compounds to make it very conductive.

It isn't even necessary for visible water to be present for corrosion to take place; all objects have a thin water film on their surfaces. This film is so thin we do not detect it by our usual senses, but even it can serve as an electrolyte to permit corrosion. A piece of iron located under the eaves of a roof where it never gets wet, will rust, not as rapidly as when it is wet, but over a period of a few weeks rust can be detected.

Electrode Material is Important

Electrode materials have an important bearing on the rate of corrosion, for they have a marked influence on the voltage of the corrosion cell. The metals have been arranged by electrochemists in a series in which they are listed in the order of their tendency to go into solution; that is, the tendency to form ions. This is the well-known electromotive series, also called the electromotive force series.

THE ELECTROMOTIVE SERIES

Table 1 gives the electromotive series; only some

TABLE 1. The Electromotive Series.

Electrode	Standard Electrode Potential, Volts	
Sodium	—2.712	Base end or anodic end
Magnesium	—2.34	
Aluminum	—1.67	
Zinc	—0.76	
Chromium (trivalent)	—0.71	
Iron (divalent)	—0.440	
Nickel	—0.250	
Tin	—0.136	
Lead	—0.126	
Hydrogen	0.000	
Copper (divalent)	+0.345	
Copper (monovalent)	+0.552	
Silver	+0.800	
Platinum	+1.2	
Gold (monovalent)	+1.68	Noble end or cathodic end

of the more common metals are listed. The voltages given are the voltages obtained in a cell prepared under definite specified conditions, in which the metal named is one electrode and a hydrogen electrode is the other electrode. In this table the potential of the hydrogen electrode is arbitrarily taken as zero. To obtain the voltage developed when any two metals are used as electrodes, subtract the smaller electrode potential from the larger if the signs are alike, and add them if the signs are opposite.

Electromotive Series Tells Many Things

Materials at the top of the table go into solution relatively easy; sodium will combine with water spontaneously and rapidly. Down the list this tendency decreases. By the time we reach platinum, the metal will not dissolve (that is, it will not corrode) even in strong nitric acid. In general, the tendency of metals to corrode decreases as we go down the electromotive series.

When two different metals serve as electrodes in a voltaic cell, the metal higher in the series will be anode and will corrode; the other metal, the cathode, usually is not harmed. Also, the farther the metals are apart in the series, the greater will be the voltage of the cell and the greater will be the corrosion tendency.

A metal may displace one below it in solution. For example, a piece of iron or nickel placed in a copper sulfate solution will go into the solution in place of the copper, and the copper will precipitate on the nickel or iron as a metal coating. This phenomenon is called *deposition by immersion*.

Use the Electromotive Series Cautiously

Experimental conditions under which the voltages given in the electromotive series were obtained are very definite as to the nature of the electrolyte, its concentration, and its temperature, and any deviation from such conditions will give different voltages.

For instance, if the concentration of the electrolytes used is diluted over the specified conditions, the voltages will shift toward the basic end of the series. As an example, by making the concentration of copper ions in the solution sufficiently dilute, the voltage of copper can be made to move toward that of zinc, and even to move above it.

On the other hand, if zinc contains .01 percent tin, its voltage will move down to below that of iron in the series. The same is true if pure zinc and its solution are heated to near the boiling point. Actual voltage of an electrode will vary with the kind of electrode, alloying metals in the electrode, kind of solution, and concentration and temperature of the solution.

These few examples illustrate that the electrode potentials obtained in practice are not always the same as standard potentials and that erroneous conclusions can be drawn and costly mistakes made by rigid applications of standard electrode potentials when conditions are other than standard.

What, then, is the value of the table of electromotive series? Corrosion engineers who understand the full significance of the table, and its limitations, are able to design and plan installations in which corrosion is kept to a minimum. Even beginners can learn some of the more fundamental principals of the table and apply them to good effect.

Again, Beware of Plus and Minus Signs

In the electromotive series, Table 1, the electrode potentials for metals above hydrogen are marked negative, those below hydrogen, positive. This is arbitrary. In Table 2 a few metals and hydrogen are

TABLE 2. Several Arrangements of Single Electrode Potential.

A		B	
Sodium	—2.71 volts	Sodium	+2.71 volts
Zinc	—0.76	Zinc	+0.76
Iron	—0.44	Iron	+0.44
Hydrogen	0.0	Hydrogen	0.0
Copper	+0.35	Copper	—0.35
Gold	+1.68	Gold	—1.68
C		**D**	
Gold	+1.68 volts	Sodium	+4.39 volts
Copper	+0.35	Zinc	+2.44
Hydrogen	0.0	Iron	+2.12
Iron	—0.44	Hydrogen	+1.68
Zinc	—0.76	Copper	+1.33
Sodium	—2.71	Gold	0.0

selected from the electromotive series to show how they can be arranged in various ways, and nobody can say that any one way is basically more or less correct than any other. Column A is the same arrangement as given in Table 1. Column B uses the same numerical figures as in Column A, but the signs are reversed. Column C is similar to Column A but the list is turned upside-down. Column D uses the gold electrode instead of hydrogen as the zero point.

Column A is the arrangement commonly used by corrosion engineers and is the one used in our discussion. Some chemists prefer the arrangement in Column B. The two columns have several things in common. Some people refer to magnesium being **above** iron in the series, or gold being **below** copper, and this applies to either arrangement, A or B. But to say that magnesium is more electronegative than iron is correct on the basis of Column A but not on that of Column B. Therefore, such expressions can be confusing.

Column C shows an arrangement **that is not used,** and let us hope it never will be, for it would cause more confusion whenever a person tried to convey his ideas to another. Column D shows another of dozens of different arrangements that could be used. Let us hope that the person who tries any of these has not yet been born; arrangements shown in Columns A and B are causing enough confusion, let no one add to it.

Out of all this possible confusion two items help us to keep a clear course. No matter what the arrangement, A, B, C, D, or hundreds of other legitimate arrangements that could be made, **the difference in the voltages between any two metals is the same in all of them.** This is a basic fact of nature and nobody can change it. The other is, no matter what arrangement is used, we can legitimately call the end of the table containing sodium, magnesium, etc., the base end (from base or common metals) and the other the noble end (from noble metals, like gold and silver).

Therefore, in this discussion, we will not say, for instance, that magnesium is electronegative to iron, or that gold is electropositive to iron, but that magnesium is more basic than iron and that gold is more noble than iron. If we can keep the arrangement shown in Column C from coming into use, we can also properly say that magnesium is above iron in the electromotive series. Also, the metals toward the basic end are anodic to metals below them and, conversely, metals toward the noble end of the series are cathodic to metals above them.

These explanations are given so that you will not become confused when you hear or read statements regarding the electrode potentials. With the above as a guide you will usually be able to orient yourself and will be on guard when terms are misused or used loosely.

Part 2 will appear in the next issue of *American Gas Journal*.

Conductive use of electronic pipe finder to determine possible areas of contact between various underground services in the same area. Note that the transmitter has been directly coupled to one of the underground lines. The receiver held by the operator is being used to trace this line and any other lines that may be electrically connected.

Electronic Pipe Finder Is Valuable Tool in Making Corrosion Control Investigations

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ELECTRONIC PIPE FINDERS are as common a tool in the gas distribution industry as are shovels or pipe wrenches. As is natural with such a piece of special application equipment, numerous field techniques have been evolved through trial and error. These special techniques are, of course, beyond the scope of any instruction manual. Some of the more interesting and unusual field techniques for the electronic pipe finder are those developed to assist in corrosion control work.

Pipe Finder Theory

A clear understanding of the "how" of these field techniques requires some small discussion of the "why" of the instrument itself. The functioning of the electronic pipe finder is founded on simple electromagnetic theory.

Basically, an electromagnetic field is artificially created in the soil about the pipe or object sought. Metal objects or, more generally, changes in the soil's conductivity create changes in this field. Pipes are detected and traced by their effect on this field. The instrument consists of two basic component parts: A radiotype transmitter and a directional radio receiver.

Function of the transmitter is to generate in the buried metal object, either through inductive or conductive methods, the desired electromagnetic field. The **inductive** method refers to the creation of the electromagnetic field in the object or pipe sought by radiation from the transmitter through both soil and air. **Conductive** operation

occurs when the transmitter is connected directly by means of a cable or other electrical contact to a known or exposed position of the pipeline.

The pipe finder's directional receiver provides a convenient method of tracing and detecting the electromagnetic field and thus the buried pipe itself.

The conductive method is the most helpful in corrosion work since the field producing currents supplied by the transmitter follow paths through the buried lines identical to those followed by corrosion causing d-c currents. Hence, here is a ready made system for tracing hidden and unknown d-c pipe paths.

Locating Buried Pipe

Most common and universally helpful task performed by the tool is pipe-finding itself. Individual pipes can be traced with pinpoint accuracy and their depth determined. Individual lines can be traced through a maze of adjacent lines. Bends, services, deadend laterals, manhole covers, and valve boxes can be located. Thus the pipe finder, aside from its principal designed function, serves a highly useful function for corrosion control work. This is particularly so during extensive pipe-to-soil potential surveys. The line under investigation must first be located and traced before potential measurements can be made.

Continuity Checks

Electrical continuity between adjacent utilities can be easily checked by using the transmitter conductively, so that the signal is conductively impressed on an exposed portion of the line under study. This line, of course, can be traced. In addition, if this line is accidentally or inadvertently in contact with other sub-surface lines, these lines will pick up the conductively induced signal. They can then be traced and the point or points of contact located. In this way, unknown points of contact can be discovered.

Locate Insulating Couplings

Insulating couplings in the line under study can also be located. They are identified by the abrupt termination of the conductively induced signal. The operator traces out the pipe from where the transmitter signal is applied. Presence of an insulating coupling, or a dead end of the pipe itself, will cause the signal to be abruptly terminated.

Soil Conductivity Checks

Changes in soil conductivity can be quickly and easily observed with the pipe finder. So-called soil "hot-spots" can be located in advance of the pipe laying. For this application, the instrument is used inductively with the receiver and transmitter coupled together with the carrying handle. The instrument is then balanced or adjusted over the soil that is noncorrosive, or at least average for the area under consideration. The pipe finder is then carried along the proposed route.

Areas of higher soil conductivity, or corrosiveness, will cause an instrument indication. These areas can then be studied in detail with regular soil resistivity equipment. Use of the instrument for reconnaissance for corrosive areas is simple and rapid so that large areas along the proposed route can be quicky checked.

The pipe finder, then, can be readily adapted to help solve many field problems associated with corrosion investigations. There are undoubtedly many additional applications that have not been mentioned here. As with any special purpose instrument, widely varying time and money saving applications can be found and profitably used when the field man understands the theory of operation of the instruments at hand as well as the theory of the job to be done. * * *

"Electronic Witch" pipe finder is used to trace adjacent pipelines in vicinity of major pipe failure caused by corrosion.

Actual pin pointing of line. Work can be so accurately done that a stick or contact probe can be driven down to the pipe itself.

Work Load Forecasting

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IN ORDER TO CONTROL the work load and balance it with the available manpower, some means of load forecasting is a necessity. This is accomplished by keeping accurate records of incoming orders and production statistics and using these in estimating work loads under various conditions of operation. In load forecasting, the words "what is past is prologue" were never more significant.

By utilizing information contained in past records and taking into account expected weather conditions, it is fairly simple to forecast the total number of orders expected the next day. The 1955 and 1956 figures for Washington Gas Light Company show the following pattern of incoming orders:

Month	% Orders Taken Prior to D-Day	% Orders Taken On & For D-Day
Sept. 1955	80	20
Oct. 1955	75	25
Nov. 1955	60	40
Dec. 1955	60	40
Jan. 1956	60	40
Feb. 1956	60	40
Mar. 1956	60	40
Apr. 1956	65	35
May 1956	70	30
June 1956	75	25
July 1956	75	25
Aug. 1956	75	25

Determining "Next Day" Orders

Using this information plus knowing the number of orders already on hand for the next day as taken from the *Incoming Order Count— Future Date*, it is possible to estimate the total number orders expected for the next day.

As an example, assume the order count sheet at 10:00 p.m. shows there are already 1200 orders on hand for tomorrow. Since it is December, this figure represents 60 percent of the total expected. Estimated total number of orders for tomorrow would therefore be 2000. With 1200 orders already on hand, 800 would be received during course of the day. From this information plus production statistics, it is possible to determine manpower requirements.

Total manpower during period from mid-September through mid-March is sufficient to take care of 2250 orders using a minimum of overtime. Only 2000 are expected; therefore, more than enough manpower is available. In fact, some fill-in work will more than likely be needed.

Half-Day Routes Help

Sufficient partial day routes must be planned to take care of the 800 orders expected during the day. The number of servicemen assigned to radio cars plus the men assigned to night work can handle an estimated 600 orders. Sufficient half-day routes and two-order routes must be planned to handle the remaining 200 orders. Production records indicate 40 servicemen assigned to half-day routes would be sufficient to handle these orders.

To take care of unexpected weather changes and any emergencies that may arise, the number of partial-day routes planned for the next day is normally increased above the forecast by an arbitrary factor based primarily on experience. The example indicates 40 half-day routes would be sufficient to handle the expected work load. Weather conditions being what they are in December, the dispatchers would be informed to make up 60 half-day routes for the next day.

Some companies transfer men on almost a daily basis as manpower requirements dictate. Fortunately, this company has always had sufficient fill-in work on hand, thus eliminating the problem of daily shifting manpower. Some 20 men from the meter repair section are transferred to the service section beginning in the middle of September and remain until mid-March of the following year. In mid-March, the 20 men are returned and approximately 25 additional men from the service section are sent to the meter repair section. The entire group remains there until mid-September, when the operation is again reversed. When the 20 men from the meter repair section join the service group, 25 assistant servicemen are made acting servicemen for the winter months. In this capacity they perform the same work as servicemen.

Editor's Note: Because the author, Mr. Tarapchak, has covered his company's operations so thoroughly, the final part of the series on modern service request dispatching has appeared in two sections. This section concludes this informative series.

Following Up the Forecasts

Load forecasting does not terminate with a simple estimate of the work load for the next day. A close check of the incoming orders and the available manpower is made during the course of the day, also. The *Load Forecast* form is used for this purpose. This form is completed at 11:00 a.m., rechecked at 2:00 p.m. and again at 4:00 p.m. Information obtained from this is very important in determining when the work load is such that overtime must be planned or when restrictions must be placed on incoming orders.

Because the system is divided into two work load sections, separate load forecasts are made for each. One covers the District of Columbia and Maryland combined while the second covers the Virginia area.

The top section of the *Load Forecast* form is for information only. The middle section gives the manpower available to take additional work during the course of the day. The bottom section is where an estimate of the number of orders to be received during the day is made. This information is then transcribed into manhours required. The manhours required are compared to the manhours available. If the available exceeds the required, fill-in work will be needed. If the reverse is true, overtime would be necessary in most cases during winter months. With weather conditions mild, the order execution schedule would be altered to bring the work load in balance with the available manpower.

Again returning to the example — it

was estimated that 800 orders would be taken during the course of the day and the manpower was planned accordingly. At 11:00 a.m. of the day the *Incoming Order Count — Today* is read. The today orders also follow a definite pattern according to the hour of the day. The 1955 and 1956 records indicated the following:

Month	% Today Orders Rec'd by 11 a.m.	% Today Orders Rec'd by 4 p.m.
Sept. 1955	40	80
Oct. 1955	40	80
Nov. 1955	40	75
Dec. 1955	40	75
Jan. 1956	40	75
Feb. 1956	40	75
Mar. 1956	40	80
Apr. 1956	45	80
May 1956	45	85
June 1956	40	85
July 1956	40	85
Aug. 1956	40	85

The same information for the 2:00 p.m. count is not prepared in detail, but this figure usually is 65 percent for the winter months.

From the preceding information and figures obtained from the *Incoming Order Count of Today* orders, it is possible to closely estimate and check the number of today orders received. As an example, assume that the 11:00 a.m. count for this December day showed that 300 orders had been received. Since this represents 40 percent of the today orders, the total estimated today orders would be approximately 720. At 2:00 p.m., 65 percent or 470 orders should have been received, and at 4:00 p.m., 75 percent or 540 orders should be on hand.

Converting Orders to Manhour Needs

To transfer orders into manhours for these estimates, 40 minutes or .7 manhours per order is used. True, this figure is not exact; however, it is considered accurate enough for load forecasting. Multiplying the estimated today orders plus those that may not have been dispatched at 8:00 a.m. by .7 gives the total manhour requirements for today orders.

This single figure, however, is insufficient as a breakdown of *day* and *after hour* work is required. It is highly possible, for example, to have a surplus of manpower available on day work and a shortage on night work, necessitating overtime.

After hour orders are considered as any taken for execution after 4:00 p.m. Again, from past experience, the after hour orders follow a definite pattern, as indicated previously. During most of the winter, after hour orders represent 25 percent of the today orders. By using this information, the number of orders and, consequently, the man-hours required for after hour orders can be estimated.

Subtracting the manhours required for *after hours* orders from the total manhours required for the total *today* orders, gives the manhours required for the day orders only.

Thus far, only the manhours required for both the day and after hour orders have been obtained. The next step is to determine the manpower available to take additional orders. This information is obtained from the center section of the *Load Forecast:*

- The number of men assigned to radio cars for both day and night work is noted in the appropriate columns.
- Day radio men start out with two orders, and each has an estimated 5.5 available hours to take additional work.
- Men assigned to half-day routes have 4.0 available hours each for additional work.
- A large group of the night men report at 2:00 p.m., and only a small portion of their time is spent on working day orders. It is estimated that the 2 o'clock men devote 2.5 hours to working day orders and 4.5 hours on after hour orders.
- Night men reporting at 4:00 p.m. work an average of 7.0 hours each on *after hour work.*

From this information, the manhours available for both day and night work is obtained. Comparing these with the manhours required determines whether or not overtime is required. The factor of 5.0 hours per man is used for estimating number of servicemen required on overtime.

LOAD FORECAST

Date 11/29/56

MANPOWER	Day	Night 2-10:30	Night 4-12	Midnight
1 Total Operators - WASHINGTON (275)	225	29	16	5
2 Operators Assigned Off	19	2	4	1
3 Operators Off - Sick	9			
4 Operators Assigned to Other Departments	1			
5 Operators Off - Other Reasons	1			
6 Operators on Transfer	1			
7 Operators Called In on Scheduled Day Off	0			
8 Operators (Night) Called In Early	0			
9 Total Operators Working	196	27	12	4
10 Total Assistant Servicemen Working	30	3	2	2
	Radio	2 - Order & 1/2 Day		Full Day
11 Operators Assigned to Service Routes - Day	22 x 5.5	15 x 7 42 x 4 27 x 2.5		103
12 Operators Assigned to Service Routes - Night	12 x 7	27 x 4.5		-
13 Operators Temporarily Assigned to - VIRGINIA				7
14 Operators Assigned to Commercial				4
15 Operators Assigned to A.I.S.				7
16 Operators Assigned to Construction				15
17 Operators Assigned to Repairs				7
18 Operators Assigned to Cleans				3
19 Operators Assigned to Training				10
20 Operators Assigned to Other Work				15
ORDERS	Estimated	Actual		
21 Total Orders Taken Previously	1169			
22 Orders on Hand at 8:00 A.M. (Not Dispatched)	199			
23 Order Count at 11:00 A.M. (x 2.4)	352			
24 Estimated Today Orders - Total	845			
25 After Hours Orders (Estimated) (20%) 56 +	169			
26 Man Hours Required - Day	613			
27 Man Hours Available - Day	462			
28 Man Hours Required - Night	158			
29 Man Hours Available - Night	206			
30 No. Operators on Extended Overtime	21			

FIG. 12.

How Forecast Is Made

Fig. 12 shows a complete *Load Forecast* for November 29, 1956. This forecast is headed Washington, which actually includes the District plus Maryland.

Items 1 through 20 are filled in by the assignment group.

Item 21 is taken from the incoming order count sheets.

Item 22 is entered by the dispatchers on the midnight to 8:00 a.m. shift.

This figure represents the number of day orders that were on hand, but not dispatched to the men reporting at 8:00 a.m. After making up the routes, the dispatchers may have one or two orders left over in several routes. Rather than try to combine the leftovers into a work route, the orders are held and are dispatched during the course of the day.

If the weather is extremely cold, certain types of orders may be withheld to increase the available manpower in the field to take the expected

No Heats as they are received early in the a.m. This is another factor which results in Item 22.

Item 23 is taken from the *Incoming Order Count — Today.*

Item 24 is obtained by multiplying Item 23 by 2.4. The factor 2.4 represents 40 percent of the total orders to be received.

Item 25 listed in the column is 20 percent of Item 24. During November, after hour orders normally represent 25 percent of the total today orders. Weather conditions during the week were such that only 20 percent of the today orders received were after hours Therefore, 20 percent rather than 25 percent was the factor used this day.

The figure 56 directly before the estimated column of Item 25 is the number of after hour hours received prior to this day for execution on this day. The total after hour hours for which manpower must be provided is 56 plus the estimated 169.

Item 26 is obtained by subtracting the 169 in Item 25 from 845 of Item 24, adding the 199 of Item 22 and multiplying this figure by .7. This separates the after hour orders from the estimated total so that manpower for day orders only can be obtained. The time factor of .7 is based on 40 minutes per order.

Item 27 is obtained from Items 11 and 12. The man hours required per day is arrived at as follows:

ESTIMATED WORK ALLOWANCES FOR DISPATCHING

Type of Work	
Meter Work	
Set (5 & 10)	75 min.
Reset	40 min.
Change	40 min.
Remove	20 min.
Turn On	30 min.
Turn Off	15 min.
State and On	20 min.
Meter Installation Service	45 min.
Leak	40 min.
House Heating	
Adjust	40 min.
Clean	115 min.
Turn On	30 min.
Turn Off	15 min.
Water Heater - Adjust	35 min.
Range - Adjust	35 min.
Refrigerator	
Adjust	40 min.
Clean	85 min.
Air Conditioner - Adjust	105 min.
Commercial Appliance	
Adjust	65 min.
Inspection	95 min.
Other Appliance (Dryer, Incinerator, etc.)	
Adjust	35 min.
House Piping	
Prove	65 min.
Misc.	45 min.
High Bill	45 min.
Collecting	35 min.
Regulator Installation Service	50 min.
Pick-up or Return Key	15 min.

Route Loading

Route No.	Min.	Route No.	Min.
1, 2	455	60-62	480
3, 4	470	63, 64	470
5	455	65	455
6	470	66, 67	470
7	455	68	455
8	470	69-71	445
9	455	379	430
10	470	380	420
11-13	455	381	430
14	470	382	420
15	455	383	430
16	470	384	420
17	455	385	410
18	470	386	420
19	455	390	470
20, 21	445	391	455
22	430	392	455
23-27	445	393, 394	445
28-31	455	395-398	430
32-34	470	399	445
35	480	100	445
340	420	101, 102	455
41, 42	430	103	470
343	420	104-106	480
44, 45	430	107	455
346	420	108	445
47	430	109	480
348	420	110	470
49	445	111	445
50, 351	430	112	430
352, 353	455	121	470
354, 355	480	122.123	445
356	460	124-126	455
357	455	127	445
		128	420

FIG. 13.

No. of day radio cars $\times 5.5 = 22 \times 5.5 = 121$
No. of 2 order routes $\times 7.0 = 15 \times 7.0 = 105$
No. of half-day routes $\times 4.0 = 42 \times 4.0 = 168$
No. of 2 o'clock men $\times 2.5 = 27 \times 2.5 = 67.5$
Total 461.5 (or 462)

Item 28 is obtained by taking Item 25 and multiplying by .7.

Item 29 is obtained from Item 12 as follows:

No. of 4 o'clock men $\times 7.0 = 12 \times 7.0 = 84$
No. of 2 o'clock men $\times 4.5 = 27 \times 4.5 = 121.5$
Total 205.5 (or 206)

Item 30 is obtained by comparing Items 27 and 26. This indicates there is a deficiency of 151 manhours for day work.

Comparing Items 28 and 29 shows a surplus of 48 manhours for night work. Since the night men can be used to work day orders, the net result is a deficiency of 103 manhours.

By dividing this figure by 5 (average number of hours worked by a man continuing on extended overtime), indicates 21 servicemen will be required on overtime.

The term "operators" is used in the *Load Forecast* as this combines the special servicemen and servicemen into one group for manpower estimates.

As previously stated, an important function of load forecasting is to determine manpower requirements for different conditions of operation. During the winter months, the company can complete approximately 2250 orders per day with a minimum of overtime. A total of approximately 2900 orders can be worked per day by using all servicemen on day work who have volunteered to work extended day overtime. Calling in men who have been scheduled off, plus calling in the night men early, and using all servicemen who have volunteered to work overtime from the day shift, a total of 3200 orders per day can be worked. With maximum effort — that is, calling in the servicemen scheduled off, calling the night men in early, and assigning all servicemen on the day shift to work an extended day — a total of approximately 4200 orders can be completed.

Forecasts Determine Action

Forecasting the work load a day in advance determines what course of action is to be taken. If approximately 2900 or more orders are expected, the men scheduled off are called in and the night men are called in early. When more than 4200 orders are expected, restrictions must be placed on incoming orders.

The company has a saturation of house heating greater than 50 percent. Consequently, a very high percentage of the orders taken during the winter months involve house heating. Up until a certain time at night, any such orders involving no heat are taken for execution for same day as received. This situation necessitates the frequent practice of going to the use of extended overtime rather than curtailment of house heating orders.

Route Loading

Route loading as described in this section is the method by which the quantity of work to be given servicemen is determined. For this purpose, quantity of work is measured not in number of orders but in terms of hours or minutes.

Route loading is divided into two closely related operations — the making up of routes on the midnight to 8:00 a.m. shift and the dispatching of additional work to servicemen as they call in from the field. The first, that of route loading on the midnight to 8:00 a.m. shift, is next outlined in detail.

An estimated work load forecast is first made by taking into account weather conditions and the number of orders already on hand for the next day. The orders on hand for the next day are obtained from the incoming order count sheet. From this, the route loading plan is determined and this in-

formation then given to the midnight dispatchers to follow in making up routes. A typical example of a loading plan for a normal winter day would be:

60 — Half-day routes

30 — Two-order routes

All other non-radio equipped servicemen to be loaded with full day's work.

The number of radio equipped vehicles on the various shifts remains constant and dispatchers know these men are to start with two orders. Also, the special servicemen start with an estimated two hours of work each.

From the preceding, the midnight dispatchers determine which routes are to be half-day and which are to be two-order routes. They usually scatter these throughout the entire system so as to get the necessary coverage for dispatching additional orders received during the course of the day.

Planning the Loads

By use of the *Estimated Work Allowances for Dispatching* form, the dispatchers load the various routes accordingly. For example, the serviceman who is assigned to work service route No. 1 and, if he is to be loaded for an estimated full day's work, is given a total of 455 minutes of work. Servicemen with a full day's work working route No. 61 would be given 480 minutes of work. The estimated times for the various types of orders are indicated on the left side of the estimated work allowance sheet. Dispatchers simply total the minutes of the orders in a particular route and when they reach the loading time indicated, stop. That is the estimated full day's work for the serviceman working the route. Servicemen who are to be loaded with a half day's route are given work to total half the time indicated on the estimated work allowance sheet.

The times for the various orders are totaled on an adding machine.

The allowance times for the routes were determined as follows:

A total of 480 minutes of work time is theoretically available for each man. Some portion of this time is unproductive as it takes a serviceman a short time to leave and return to the shop each day. Some time, also, is required to travel to and from the route to which a serviceman is assigned. Time for making a mid-morning and mid-afternoon stop must also be taken into account. These three items are deducted from the total available time.

A correction factor is then applied to take into account orders which are C.G.I., not ready, etc. This factor is constant and is added to the servicemen's available productive time.

Taking service route No. 1 as an example, its loading time was arrived at by:

480 Mins. — Total available time
15 Mins. — Shop time in A.M.
15 Mins. — Shop time in P.M.
15 Mins. — Travel time to route 1 in A.M.
15 Mins. — Travel time from route 1 in P.M.
15 Mins. — Call time in Mid-A.M.
15 Mins. — Call time in P.M.
390 Mins. — Available after above deductions

Adding 17 percent to the 390 minutes for C.G.I.'s, not ready, etc., gives 455 minutes as the loading allowance for route No. 1. When considering all service routes, the only variable factor is the estimated travel time to and from each route.

Travel time between orders is taken into account by adding five minutes to the time for each order. The estimated time for the completion of the various types of orders on the dispatch allowance sheets includes the five minutes travel time. Where the sheet shows the average time to complete a house heating order as 40 minutes, it includes 35 minutes on premises time plus 5 minutes travel time to the job.

The estimated work allowances for dispatching for the various types of orders were arrived at by taking the actual on-premises time for large numbers of orders and arriving at an average time per order. Travel time of five minutes between jobs was arrived at in the same manner. Monthly production statistics give the necessary information to compare and, if necessary, make any changes in the allowances for the types of orders.

Dispatching Additional Work

Since not all servicemen are dispatched an estimated full day's work, a second means of route loading is used to take care of these servicemen with

ESTIMATED WORK ALLOWANCES FOR DISPATCHING

Type of Work	
Meter Work	
Set (5 & 10)	75 min.
Reset	40 min.
Change	40 min.
Remove	20 min.
Turn On	30 min.
Turn Off	15 min.
State and On	20 min.
Meter Installation Service	45 min.
Leak	40 min.
House Heating	
Adjust	40 min.
Clean	115 min.
Turn On	30 min.
Turn Off	15 min.
Water Heater - Adjust	35 min.
Range - Adjust	35 min.
Refrigerator	
Adjust	40 min.
Clean	85 min.
Air Conditioner	
Adjust	105 min.
Commercial Appliance	
Adjust	65 min.
Inspection	95 min.
Other Appliance (Dryer, Incinerator, etc.)	
Adjust	35 min.
House Piping	
Prove	65 min.
Misc.	45 min.
High Bill	45 min.
Collecting	35 min.
Regulator Installation Service	50 min.
Pick-up or Return Key	15 min.

AM	PM	MIN.
10:30 to	4:30	330
10:40 to	4:30	320
10:50 to	4:30	310
11:00 to	4:30	300
11:10 to	4:30	290
11:20 to	4:30	280
11:30 to	4:30	270
11:40 to	4:30	260
11:50 to	4:30	250
12:00 to	4:30	240

Special Servicemen to be given two (2) hrs. work up to 2:00 P.M. Thereafter load to stop time. Servicemen with call times in A.M. to be given 4 hrs. work. Call times in P.M. to be loaded to stop time.

Travel Allowance

Route No.	Min.	Route No.	Min.	Route No.	Min.
1, 2	15	343	30	390	10
3, 4	10	44, 45	25	391	15
5	15	346	30	392	15
6	10	47	25	393, 394	20
7	15	348	30	395-398	25
8	10	49	20	399	20
9	15	50, 351	25	100	20
10	10	352, 353	15	101, 102	15
11-13	15	354, 355	5	103	10
14	10	356	10	104-106	5
15	15	357	15	107	15
16	10	60-62	5	108	20
17	15	63, 64	10	109	5
18	10	65	15	110	10
19	15	66, 67	10	111	20
20, 21	20	68	15	112	25
22	25	69-71	20	121	10
23	20	379	25	122, 123	20
24-27	20	380	30	124-126	15
28-31	15	381	25	127	20
32-34	10	382	30	128	30
35	5	383	25		
340	30	384	30		
41, 42	25	385	35		
		386	30		

AM	PM	MIN.	AM	PM	MIN.
12:30 to	4:30	240	4:20 to	10:30	340
12:40 to	4:30	230	4:30 to	10:30	330
12:50 to	4:30	220	4:40 to	10:30	320
1:00 to	4:30	210	4:50 to	10:30	310
1:10 to	4:30	200	5:00 to	10:30	300
1:20 to	4:30	190	5:10 to	10:30	290
1:30 to	4:30	180	5:20 to	10:30	280
1:40 to	4:30	170	5:30 to	10:30	270
1:50 to	4:30	160	5:40 to	10:30	260
2:00 to	4:30	150	5:50 to	10:30	250
2:10 to	4:30	140	6:00 to	10:30	240
2:20 to	4:30	130	6:10 to	10:30	230
2:30 to	4:30	120	6:20 to	10:30	220
2:40 to	4:30	110	6:30 to	10:30	210
2:50 to	4:30	100	6:40 to	10:30	230
3:00 to	4:30	90	6:50 to	10:30	220
3:10 to	4:30	80	7:00 to	10:30	210
3:20 to	4:30	70	7:10 to	10:30	200
3:30 to	4:30	60	7:20 to	10:30	190
3:40 to	4:30	50	7:30 to	10:30	180
3:50 to	4:30	40	7:40 to	10:30	170
4:00 to	4:30	30	7:50 to	10:30	160
2:00 to	10:30	480	8:00 to	10:30	150
2:10 to	10:30	470	8:10 to	10:30	140
2:20 to	10:30	460	8:20 to	10:30	130
2:30 to	10:30	450	8:30 to	10:30	120
2:40 to	10:30	440	8:40 to	10:30	110
2:50 to	10:30	430	8:50 to	10:30	100
3:00 to	10:30	420	9:00 to	10:30	90
3:10 to	10:30	410	9:10 to	10:30	80
3:20 to	10:30	400	9:20 to	10:30	70
3:30 to	10:30	390	9:30 to	10:30	60
3:40 to	10:30	380	9:40 to	10:30	50
3:50 to	10:30	370	9:50 to	10:30	40
4:00 to	10:30	360	10:00 to	10:30	30
4:10 to	10:30	350	10:10 to	10:30	20
			10:20 to	10:30	10

NOTE: Lunch allowance has been made. Dispatcher make travel allowance to office

FIG. 14.

only a partial day's work. The *Estimated Work Allowances for Dispatching* is used by clerks and the dispatchers in the today dispatch room for this purpose.

Servicemen with a partial day's work are assigned at least two call-in times, one in the morning and the other in the afternoon. When they call in on their first call time, they are given sufficient work to total four hours. This keeps them busy until their afternoon call time, at which time they are given additional orders to keep them working until time to return to the shop.

To aid the clerks and dispatchers in determining how much available work time a serviceman has when he calls in, the estimated work allowance sheet and a *Call Record* are used.

The clerk taking the call from a serviceman first notes the time of day. He then inquires how many and the type of orders the man has remaining.

From the estimated work allowance sheet, the clerk determines the minutes of work that the man still has on hand. If it is an a.m. call, the clerk deducts this from four hours or 240 minutes and enters this on the call record. The dispatcher notes this figure and selects orders according to the serviceman's available time.

If the call is in the p.m., the clerk determines how many minutes of work the serviceman has on hand. From the time table on the dispatch allowance sheet, he notes the number of minutes remaining to the serviceman's stop time. He deducts the minutes of work the serviceman has plus the travel time from that route to the shop from the total remaining time and enters this on the call record. The dispatcher then gives the serviceman additional work accordingly.

How It Works

For example, assume the serviceman working route No. 1 calls in at 2:00 p.m. He gives the clerk information that he still has one "State and On" and one "No Heat."

Using the estimated work allowance sheet, the clerk determines the serviceman has a total of 60 minutes work on hand. From the time table on the same sheet, he notes that from 2:00 p.m. to 4:30 p.m., there remains 150 minutes of available time. He notes this on the call record as above. The clerk also notes that from route No. 1 to the shop takes 15 minutes of travel time. He notes this on the call record.

Deducting the 60 minutes and 15 minutes from the available time of 150 minutes leaves 75 minutes remaining. The clerk notes this in the appropriate space on the call record. He then passes this form to the dispatcher who notes that the serviceman can take 75 minutes of work.

Dispatcher then selects the number of orders necessary to total approximately 75 minutes. The dispatcher notes the number of minutes of work given to the serviceman on the call record. He then gives the orders and the call record to the clerk who relays the orders to the waiting serviceman.

Other information is also noted on the call record. This is primarily for overtime purposes.

Dispatching to Non-Radio Personnel

All servicemen in non-radio vehicles and assigned to full day routes are given one call time — usually in p.m. during winter months.

Those with only a partial day's work are assigned two and some three call in times. Call-in times are staggered so that the lines do not become overloaded. It is more or less understood that should a serviceman with an estimated full day's work finish early, he is expected to call in for additional work. The times for the various types

CALL RECORD

2:00 P.M.

PHONE	ROUTE	TIME IN MINUTES: ORDERS LEFT	TRAVEL TIME	TIME LEFT	ORDERS GIVEN
51	1	60	15	75	80

BY J.D.

SERVICEMAN Brown

OVERTIME YES ☐ NO ☐

TRANSFER YES ☐ NO ☐

LOCATION:

FIG. 15.

of orders are based on averages and are used for dispatching purposes only.

Loading Special Servicemen

The loading of the small group of special servicemen is slightly different from that of the servicemen. The special servicemen are started with one "special" order or if given regular work, they start with an estimated two hours work. The special servicemen are given three call-in times — one in mid-morning, a second at noon, and the third in mid-afternoon. Until the last call time, the special servicemen are given one "special" order at a time or a total of two hours of regular work. At the last call-in time, they are given sufficient work to keep them busy to stop time.

Since practically all of the men assigned to night work are in radio cars, route loading is not practiced, as servicemen in radio cars, regardless of shift, are given not more than two orders at a time. A total of 31 servicemen are assigned to radio-equipped vehicles on the day shift. Out of a total of 46 servicemen on the night shift during the heavy winter schedule, 38 are assigned to radio cars. Only two special radio-equipped trucks operate from midnight to 8:00 a.m.

Radio Equipment

Prior to 1955, all mobile radio vehicles operated on a single frequency and dispatching of all radio vehicles was the responsibility of the service department. The dispatching of service, street, and pressure department personnel in radio vehicles was without saying quite a problem. The number of radio-equipped vehicles under such operation was limited by the capacity of transmitting equipment and the dispatchers.

The company was successful in obtaining a second frequency for sole use of the service department in the summer of 1955. The number of mobile radio units within the service department has increased and will continue to do so until the capacity of the station is reached. All foremen and general foreman have radio-equipped cars.

Special radio-equipped trucks operate on a 24-hour day basis, with two-man crews changing each shift.

The dispatch group not only dispatches work to servicemen in radio cars, but it is also responsible for keeping track of the status of the radio cars. This is accomplished by a system of lights located directly under the dispatch cases in both the today and general dispatch rooms. There is one light to represent each radio car. By means of a three-way switch for each light, the dispatchers record the status of each radio car. When the switch is turned to an off position, the light is out, indicating the car is unavailable or out of service. Moving the switch to a second position causes the light to blink on and off, indicating the radio car is standing by waiting for an assignment. The third position of the switch gives a constant light, indicating the serviceman is proceeding to an assignment but can be reached in case of an emergency. Different colored lights are used to differentiate between foreman and serviceman.

Two special radio-equipped trucks outfitted with inhalators and other special equipment operate on an around-the clock schedule. The trucks are used for assisting the local police or fire departments when called. They also investigate the more serious types of orders. The two trucks are manned by two-man crews. One man remains with the truck at all times. The trucks can therefore be contacted at all times. When not on emergency orders, the two special cars are dispatched regular service work. * * *

CASE HISTORY:

Planning is Key to Success of Spring Dryer Campaign

E. N. Avegno,
General Sales Manager
New Orleans Public Service, Inc.
New Orleans, Louisiana

AT NEW ORLEANS Public Service we have found that one of the keys to a successful sales activity is in the planning, and our company, distributors, and dealers work as a team to plan and carry out appliance promotions.

Our company does not merchandise major appliances, but promotes their sale through appliance dealers. The dryer promotion conducted in the spring of 1957 is an example of how such activities are carried out.

Several months before the start of the campaign, a meeting was held with distributors and dealers to get their ideas and assistance in preparing for the dryer campaign. We suggested ideas and features for discussion and at the meeting new ideas and general approval of plans for the campaign were secured. A few days after the meeting, a letter was sent to each distributor giving complete information on the campaign.

Details of the campaign were announced to dealers and their salespeople at a "kick-off" breakfast meeting held at a local hotel immediately before the start of the campaign. A campaign prospectus was delivered to the dealer's store the day after the kick-off meeting.

Cash bonuses awarded the retail salesmen are contributed by both the distributors and dealers. Before the start of the campaign, distributors were asked to approve and return a form authorizing Public Service to bill them for their share of the bonuses won by their dealers' salespeople during the campaign period. When the dealers registered for the campaign, they signed cards agreeing to pay their share of the bonus money for dryers reported sold by their salesmen during the campaign.

At the end of the campaign, a meeting was held in the company's auditorium where the dealer salespeople received their awards. Additional cash prizes contributed by Public Service were awarded by lot.

Campaign prospectus delivered to dealers' stores outlines sales program and incentives set up for spring dryer campaign.

Keep Distributors Interested

We believe that it is important to have the distributor representatives actively interested in the campaign, and the best way to maintain interest on their part is to include them in the campaign. Three cash awards were offered distributor salespeople who did the best all around job of:

1. Getting their dealers to register and participate in the campaign.
2. Getting their dealers to send in accurate and complete reports.
3. Getting their dealers to make use of campaign display materials.

The clothes dryer campaign was well supported by advertising and promotional media. Public Service made extensive use of newspaper, radio spot announcements, television, and outdoor advertising. Dealers were offered a promotional allowance of $2 for each dryer sold to a customer of Public Service; the total allowance was limited to 25 percent of the dealer's cost for newspaper, radio, and television advertising.

"Guarantee" Boosts Sales

During the spring campaign, approximately twice as many clothes dryers were sold by the dealers as were sold in a similar period in 1956. Much of the success of this campaign can be attributed to a special feature — *Satisfaction Guaranteed* — which was offered for the first time.

"Satisfaction Guaranteed or Public Service will arrange to have your money refunded" was advertised in all our promotional media. If a customer was dissatisfied with a purchase and wished to return the dryer within 30 days after its purchase, the dryer was picked up by the dealer and purchase price, exclusive of any installation charges, was refunded. The company agreed, before the start of the campaign to pay the dealer $25 for every dryer he was required to remove, to compensate him for loss in resale below list price. Distributors agreed to add $10 for each dryer their dealers were required to remove. **Not a single dryer was taken back by a dealer!**

This *"Satisfaction Guaranteed"* feature was considered such a success that it will be included in other future major appliance promotions. With such incentives for the purchaser, and with the continued cooperation and assistance of the appliance distributors and dealers in our area, we look forward to increased appliance sales.

During the 1957 campaign, the dealers sold 1162 gas dryers. * * *

Twenty Things That Make a Good Assistant

Ernest W. Fair

SHOW ME AN EXECUTIVE *who knows how to properly pick his assistant and I'll show you a man not only successful in his business, but one who is able to really enjoy life!*

This statement by a management expert accurately describes the gas utility executive whose worries are minimized, who has leisure to do the things in life he wants, and who seldom has major worries about his post.

Selecting such a top-notch assistant is never easy. Far too often we base our selection on factors which have little if anything to do with ability to handle the job.

Here, from a study of the practical experiences of executives and professional men, are 20 assets of a good assistant. They have been proved and tested. They represent the qualities born of successful procedure in everyday business life.

Ability to get people to do things. Much of our own success depends in large measure on the ability to influence others to do the things we desire, and thereby lessen our own physical chores. The assistant who lacks this ability shoves the load onto the executive's shoulders, and lessens the latter's effectiveness on other tasks that must be accomplished.

Reliability is an absolute requirement and must be known not only to the executive, but to the executive's daily business contacts. A man with a reputation for reliability can accomplish any assignment much easier than the one without such a reputation. Reliability also assures the executive that his assistant's promises will be kept, that he can be depended upon to carry through an assignment to its conclusion, and that suggestions he gives are always reliable in themselves.

No "Yes Man," Please — for that means too much servility and complete lack of initiative or thinking ability. It's nice to have someone always agreeing with everything we say or do, patting us on the back, and constantly dishing out flattery — BUT, it's dangerous in today's highly competitive world. We often need suggestions or disagreement, even from our assistants, to keep our own thinking in line.

Grasp for detail and the ability to quickly execute detailed planning make any assistant a more valuable asset to the firm. One of the chief reasons for hiring an assistant is to take the heavy burden of detail off the executive's shoulders and leave him free for major planning, work, and executive thinking. If his assistant must have everything planned out in detail for him, then his value dips toward the zero point.

Poise and respect from our associates also helps any assistant to get the job done better and with greater dispatch. These are personal assets that compel attention from those with whom we do business. Where an individual possesses them in full measure, his tasks are always made easier; cooperation from others is more assured.

Business background has much more value to an assistant than commonly supposed. Too often we assume it unnecessary, since we feel it can be acquired or we can supply this background in time. These are the very reasons why it is better to pick an assistant who already has such background, so that our own valuable time needn't be wasted. Then, too, we can never be certain that we have passed along all of the information that an assistant should possess to do his job properly.

Ambition of the right kind is always to be desired in an assistant. Without ambition, any individual is handicapped in the performance of his tasks. With it, he will have the spark to try to accomplish every assignment with greater accuracy and perfection. The old idea that hiring an assistant with great ambition was foolish because he was sure to leave just when he became of real value to us, has been disproved. Even when this happens, that individual contributes so much more while with us than the person without ambition that hiring him is definitely worthwhile.

Willingness to follow orders is of paramount importance. If we must argue out every assignment given our assistant, valuable time is uselessly wasted. The man who has the quality to accept and follow orders, possesses an asset we can never ignore in selecting an assistant.

Properly executing the assignments calls for a frame of mind with definite willingness to follow such orders. With-

out it, we can never be sure the assigned tasks will be carried out promptly and efficiently by our assistant.

Some executive background in the past experience of the individual is also a definite asset. Often the many hurdles breaking in such a job by someone without previous experience constitutes a serious handicap. If our new assistant does have even a limited executive experience of any kind he has the equipment with which to approach these new tasks much more efficiently.

Loyalty is an absolute prerequisite for any good assistant. An individual whose whole attention is focused on his own interests, who is devoid of any intrinsic loyalty to the executive, has little value no matter how many other assets he may possess.

Such loyalty is something which is most difficult to acquire although it can be heightened by continuous contact between an executive and his assistant. There should, however, be a capability of such loyalty as a definite part of the individual's personality from the very start.

Dress and mannerisms are important in a number of ways. The effect they have on others is, of course, of vital importance. But, even more important is the effect that such dress and mannerisms have on you in the first place. We can all work more closely with an assistant who does not, in any manner, "rub us the wrong way."

Punctuality and dependability are traits of character which have high value. The lack of either can not only be costly in the operation of our business but will be a constant source of irritation. Punctuality and dependability are two traits of character which have equal impression on others also.

Working business knowledge of modern executive machines and systems is another good asset for any prospective assistant to possess for even in the smallest gas company, as modern business machines have become an important part of the office operation. With such background, the assistant will need less instruction and will be quicker in putting these business tools to more efficient use.

Well-rounded personality or "freedom from neurosis" is another asset too frequently overlooked in selecting executive assistants. The individual loaded with phobias is never capable of being such an assistant.

Initiative, so difficult to discern in an individual, is an asset very definitely to be desired. It will always pay to check the prospective assistant's background for evidence of such initiative. The information we obtain will always be more than worth the effort or expense required to do such checking.

Settled interest and goals mean an individual that is moving along a definite plan toward a distinct goal. He will be worth much more to you than the person who is still sailing aimlessly about.

Financial stability is also important, as the individual who has not mastered this important phase of his life is apt to bring such indecisions to the job.

No "chip on the shoulder" for the good assistant. Such people seldom are able to think rationally and do their jobs efficiently if they must deal with other human beings while carrying out their jobs.

Extra interest in the business is something always to be looked for as the individual working in a field of his choice is always a much happier and more efficient person, and certainly more likely to be that "special" assistant for you. * * *

Power Generation Cost Reduced by Use of Natural Gas

Arthur Q. Smith
American Gas Association, New York

CHANGING TO NATURAL GAS as a fuel for prime movers has often resulted in considerable savings. An instance to this effect may be found in the municipal power plant of Cedarburg, Wisconsin, a small but growing community about 20 miles north of Milwaukee.

Since 1926, and up to 1953, power was generated by three diesels using fuel oil and having a total capacity of 1400-kw. In 1944, this capacity was exceeded by a 1450-kw load demand, which continued to grow with the community, necessitating the purchase of additional power from an outside source to augment the local generating station supply. By 1953, this additional demand had increased to a point where some 45 percent of the power required had to be purchased at a cost of 13.5 mills per kw-hr.

It was then decided to purchase an additional unit to increase generating capacity. This new unit was an 8-cylinder, dual-fuel engine of 2800-hp rating, driving a direct connected 2500-kva, 2000-kw, 3-phase, 60 cycle, 4160-v alternator with a belt connected 25-kw exciter.

With the new unit, station capacity was increased to 3400-kw and despite the ever increasing load demand, it resulted in lowering the purchase of outside power to 35 percent with a saving of some $44,500 during the first 15 months of operation. Over a two-year period, it was found that this dual fuel unit had a fuel consumption of .00726 gal of fuel oil per kw-hr and 10.76 cu ft of natural gas per kw-hr. This was based on 980 Btu, 55 cents per Mcf natural gas and 137,000 Btu per gal fuel oil at .115 cents per gal.

When all units are in operation at capacity, it has been estimated that the use of natural gas in the dual-fuel engine has reduced overall plant cost to .009 mills per kw with actual cost per kw of the gas engine alone at .0066 mills per kw-hr. * * *

New 8-cylinder dual fuel, 2800-hp engine at the Cedarburg, (Wisconsin) Light and Water Commission plant. By the addition of this unit, purchase of outside power was reduced to 35 percent and overall plant generating costs to .009 mills per kw.

THE LAW and the gas distribution industry

Prepared by Leo T. Parker, attorney at law and contributing editor

Company is Responsible for Employee's Transportation

An official of a gas company in a small town asks: *"Is there any responsibility or liability of a gas company, which for accommodation, transports an employee from his last job to his home, and the employee is injured in an automobile wreck?"*

Of course, a gas company never is protected against an injured employee suing for damages when the injury is sustained within the scope of the employee's employment. A higher court has laid down this important ruling. **A gas company that transports an employee to his place of work or other place, owes a nondelegable duty to furnish the employee reasonably safe transportation and exercise "ordinary care" to protect him from injury during the transportation. The company is liable to the employee for injuries caused by failure of the company's agent to exercise "ordinary care" to safeguard the employee against injuries.**

For illustration, in *Montgomery v. Furlong, 219 Fed. (2d) 726,* the testimony showed facts, as follows:

One day an employee, named Furlong, had his automobile in the repair shop. Upon being advised by Furlong that his car would not be available that day, the employer replied, "I'll make arrangements to take you down there and bring you back." About 3:00 p.m. of the same day, the employer made arrangements with Mr. Martin to take Furlong to figure a job.

Pursuant to the arrangement, Furlong and Martin left in Martin's pickup truck. While rounding a curve in the highway at a speed of about 50 mph, the right front wheel of the truck left the paved portion of the highway. The vehicle traveled approximately 30 to 40 ft with the right front wheel off the pavement on the shoulder. In attempting to turn the truck back onto the pavement, Martin lost control and collided with an oncoming car, causing the accident that resulted in severe physical injuries to Furlong. As a result of such injuries, Furlong was confined in hospitals for over four months.

In subsequent litigation, the higher court held Furlong entitled to recover $32,000 damages from his employer. The higher court approved this verdict, and said:

"Where an employer enters into an agreement with his employee to transport him to his place of work, the employer owes the employee a nondelegable duty to furnish him with reasonably safe transportation and to exercise ordinary care to protect his employee from injury during such transportation, and the employer is liable to the employee for injuries proximately caused by the failure of the employer's agent to exercise ordinary care in carrying out such transportation. At the time of the accident Furlong was riding as a passenger in a conveyance arranged for by Ward (employer) to transport him to the place of work."

For comparison, see *Stout v. Schell, 206, 241 P. (2d) 1109.* In this case one Bell was employed by his employer as a truck driver, and one Willis was employed as Bell's helper. This was not a case where an employer had agreed or undertaken to transport an employee from or to his place of work. Rather, it was a case where two employees were engaged together in carrying out the employer's business at the time of the accident. In this case the higher court refused to hold the employer liable in damages for injuries sustained by Willis when Bell, the truck driver, had a wreck.

Contract Favors One Party

An important point of law is that in certain instances, the contents of a contract itself may enable one contracting party to cancel the contract or declare the contract invalid, void or voidable.

A reader in Washington, D. C., asked these questions: *"Can a manufacturer of gas appliances cancel a purchaser's exclusive agency contract? If so, under what circumstances?"*

The answer to this question depends upon the contents of the contract between the manufacturer and the purchaser or dealer. It is certain that a purchaser is bound by clauses in the contract that tend to relieve the manufacturer from liability and responsibility for cancellation of the agency contract or failure to deliver ordered merchandise.

For example, in *Myers v. Frazer, 178 Fed. (2d) 291,* it was shown that a manufacturer signed a distributor's franchise agreement, in which the latter was designated as the representative of the manufacturer in the distribution and sale of the latter's merchandise in an area or territory described in the contract.

This franchise agreement contained a clause that the manufacturer could cancel the contract and business relationship with the distributor for any cause. The franchise contract also provided that in the event of its cancellation or termination: "Neither party shall be liable to the other for damages of any kind or character whatsoever on account of any termination of this agreement provided for in this or the preceding paragraph."

A significant clause in the contract was that the manufacturer "assumes no liability to the direct dealer" nor does the distributor have any claim of any kind against the manufacturer "by reason of any delay in delivery of merchandise for any reason whatsoever."

In subsequent litigation, the higher court refused to hold the manufacturer liable to the distributor for failure to deliver merchandise ordered by the distributor, and said:

"Without indulging in observations as to the fairness or unfairness of the agreements as to either of the parties, the situation presented, simply stated, is that at the time that the franchise agreements were made, plaintiff became the dealer and distributor until the defendant (manufacturer) terminated it . . . In the event either of the parties cancelled the agreement, the language could not be clearer that the cancellation was to be without any recurring or resulting liability on the part of either of the parties on account of such cancellation . . . We need not pursue that subject further, since it is very clear that the parties agreed that defendant (manufacturer) could desist from delivering the merchandise under the orders for any reason whatever and for as long a time as it saw fit, without incurring liability. The franchise agreement constituted as much of the entire arrangement, or more than the purchase orders. Under it defendant (manufacturer) clearly had the right to terminate the entire relationship without liability, which it did."

Outcome of this late higher court decision clearly discloses that a purchaser or dealer is bound by unusual clauses in a contract by which the manufacturer is relieved from responsibility for cancelling or otherwise declaring an agency contract void. * * *

Open trench at Grove City, Ohio, intersection is well guarded as workmen of Ohio Fuel Gas Company prepare to tie-in a new section of gas main to an existing feeder line.

"WHERE GAS IS GROWING"...

Distribution Developments

... news about current and planned construction

Worcester Gas Light Company, Worcester, Massachusetts, plans construction throughout its franchise area in 1958 of approximately 40,000 ft of 2-in.; 75,000 ft of 4-in.; 15,000 ft of 6-in., and 20,000 ft of 8-in., all miscellaneous extensions of its distribution system, including some replacement of existing mains. Estimated cost is $1,179,000. Majority of work to be done by contractors.

Northwestern Utilities, Ltd., Edmonton, Alberta, Canada, will begin construction in May on distribution system work in Edmonton, Red Deer, and other cities and towns in north central Alberta, which will include installation of 480,000 ft of 1¼ to 12-in. distribution mains. Lines will include high, intermediate, and low pressure. Entire project estimated to cost $800,000. Company forces will handle construction.

Arkansas Louisiana Gas Company, Shreveport, Louisiana, plans construction during 1958 of considerable extensions within existing towns plus system installations in new cities in its service area of north Louisiana, East Texas, and south and central Arkansas. Included in the work are 831,000 ft of 2-in., 80,000 ft of 3-in., 665,000 ft of 4-in., 24,000 ft of 6-in., and 2000 ft of 8-in., to be installed in high and intermediate pressure supply mains, and in medium and low-pressure distribution mains. Most of the work will be done by company forces, with some to-be-determined projects contracted.

Central Hudson Gas and Electric Corporation, Poughkeepsie, New York, has two major construction projects planned for 1958 by its gas department. These include installation of approximately 16,000 ft of high-pressure gas main from North Cornwall to the company's gas holder station in Newburgh, to supplement gas supply to the Newburgh area, at a cost of approximately $180,000, and extension of a high-pressure natural gas main from northwest Saugerties to Barclay Heights, approximately 11,000 ft of main, to supply increasing requirements of new residential districts south of Saugerties, at an estimated cost of $110,000. Numerous other small projects are also planned for 1958.

Cincinnati Gas & Electric Company's Gas Department, during 1957, engaged in a $6,000,000 expansion program that included installation of 105 miles of new gas main construction, a record mark, to provide service to new customers, most of them residential. Nearly 80 percent of CG&E's customers use natural gas for comfort heating.

NEW

...and Sure to Win Their Way to the Heart of Industry

Many optional features, including built-in power steering, add to the versatility of the "440" Wheel-Type.

Ruggedness, power, operator's comfort, and all-around economy are featured in the new "440" Crawler.

JOHN DEERE "440" Industrial Tractors

NEW Styling Throughout . . .

NEW Long-Life Construction . . .

NEW Operator Comfort, Convenience, and Protection . . .

NEW Operating Advantages . . .

NEW Ease of Adjusting and Servicing . . . All-Around Economy.

Worthy "Stablemate" of the Popular "420"

Every inch another "thoroughbred," the new John Deere "440" is a worthy "stablemate" of the ever popular John Deere "420," the busy, capable, and economical crawler that continues to merit the praises of efficiency-minded industrial users everywhere.

With a capacity for work that must be seen to be believed, combined with a nimbleness that cuts maneuvering time drastically, they have the ability to squeeze more work out of every piece of equipment and to press more work into every hour.

HERE they are . . . trim and eager . . . and literally "born" to save you money, whatever business you're in—the New John Deere Industrial Tractors.

"Born" to save you money?

We could hardly put it better. For these are INDUSTRIAL tractors from top to bottom . . . ruggedly built from grille to drawbar . . . and designed, inside and out, to fill definite needs in industrial work of all types . . . to cut to rock bottom the costs of such jobs as earth moving, materials-handling, sand and gravel work, mowing, maintenance, and many other—often specialized—jobs in contracting, construction, utilities, manufacturing, and public works.

Both tractors are built around an amazingly efficient John Deere engine, unmatched for delivering so much, for so long, for so little cost. Both have many construction features of hood, grille, frame, and either wheel or track assemblies—plus optional new clutch-type direction reverser—that enable them to do more than their share of the day's work of pushing, pulling, lifting, digging, and hauling. Their clean, modern, functional design throughout makes them businesslike in operation, easy to service and economical to maintain. A line of proved, matched working equipment gives them the versatility that industry demands.

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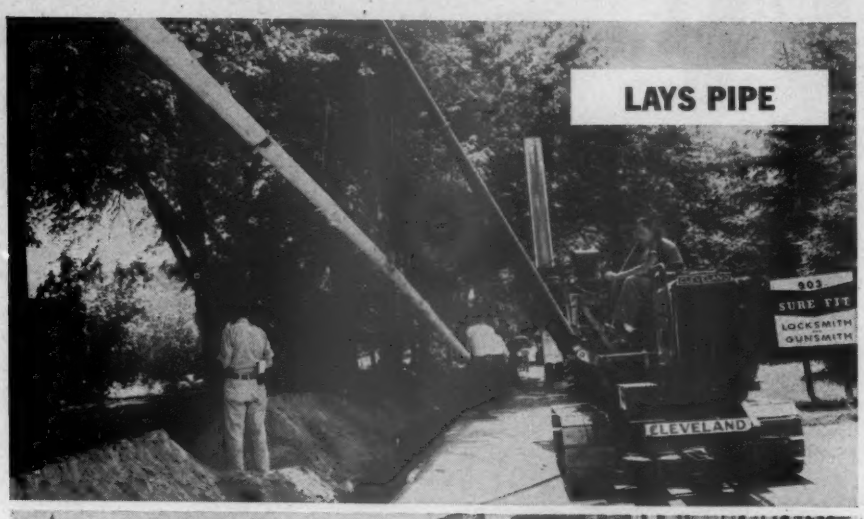

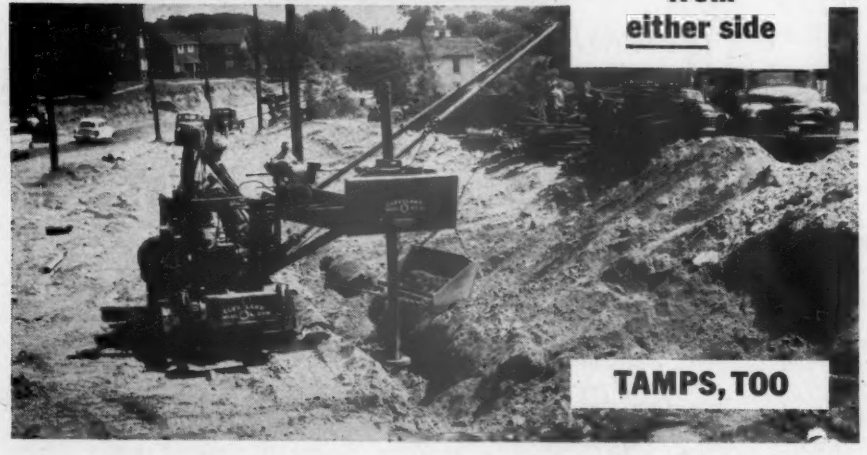

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Good Everywhere

Distribution Developments

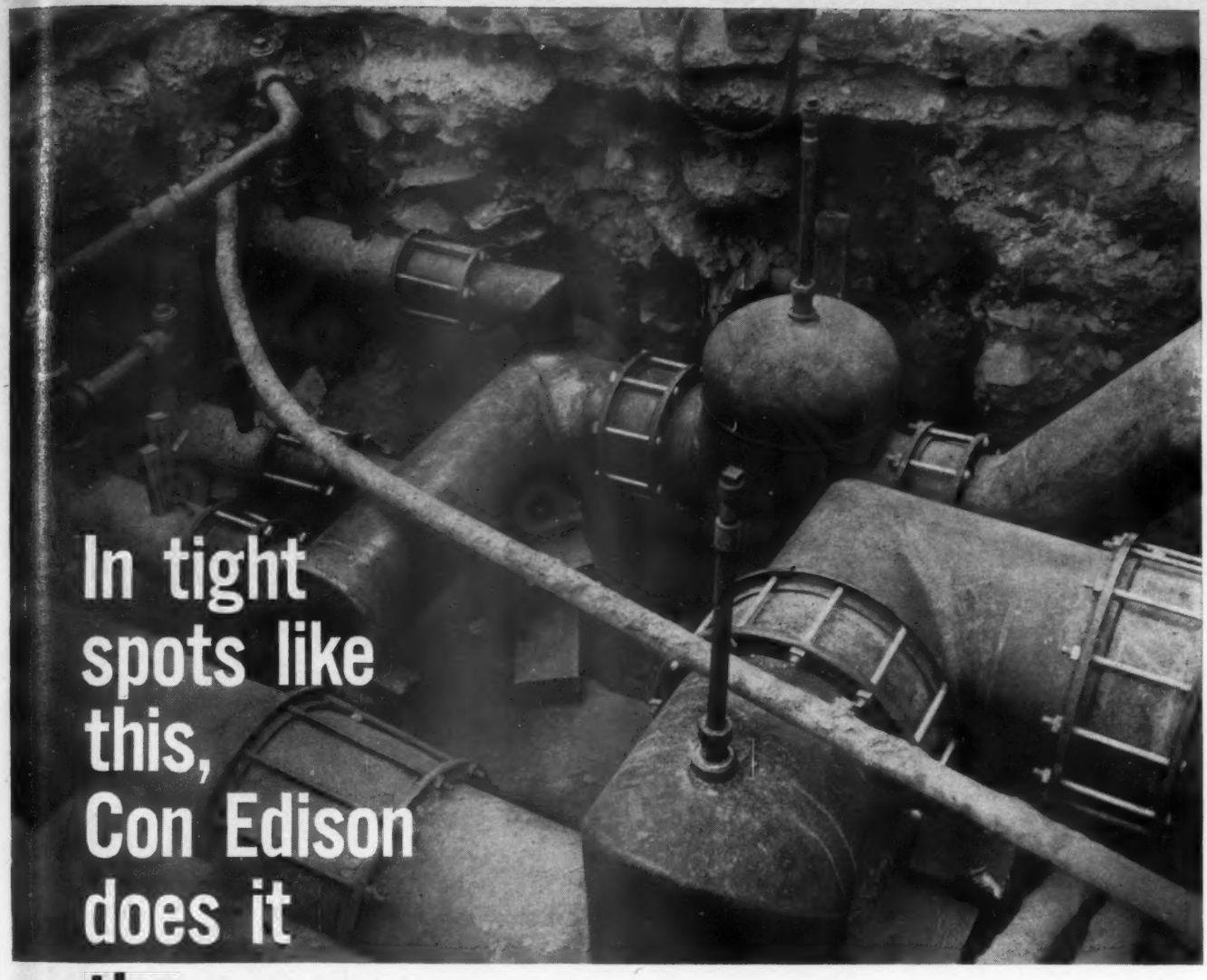
Berkshire Gas Company, Pittsfield, Massachusetts, has completed work on three projects, including 6000 ft of 4-in. high-pressure supply main, in Dalton, Massachusetts, costing $20,000, contracted by Hutchison Sand and Gravel Company; 4500 ft of 4-in. high-pressure supply main in Lee, Massachusetts, connecting Lee Lime Corporation, at a cost of 12,000, work done by Hutchison Sand and Gravel; and 6000 ft of 6-in. high-pressure supply main in North Adamas, costing $24,000, work done by Consolidated Gas and Service Corporation.

Public Service Electric and Gas Company of New Jersey, Newark, New Jersey, plans construction of some 270 miles of new gas mains on its system in 1958, to accommodate the addition of 27,000 new meters. Major factor in improving the company's gas system and making additions is the increase in gas heating customers. More than 28,000 heating customers were added in 1957, bringing the total to approximately 220,000. Approximately 110,000 more customers will be receiving straight natural gas service, bringing the total by the end of 1958 to more than 320,000 — about one-third of the company's total gas customers.

Indiana Gas & Water Company, Inc., Indianapolis, Indiana, plans to spend $1,295,000 for gas distribution construction in its service area in 1958, including 200,200 ft of new 2, 3, and 4-in. mains, and 67,500 ft of 2, 3, and 4-in. replacement mains, at estimated cost of $665,000. New regulator stations and equipment costing $30,000 will be installed this year, while new services, meters, and regulators planned for installation total $440,000. Another $160,000 for replacement services, meters, and regulators is also planned. The company provides natural gas service in 60 communities of north central, central, and southern Indiana.

Consumers Power Company, Jackson, Michigan, plans expenditure of more than $20,000,000 in 1958 by its gas department for expansion of gas service facilities. The company currently has a backlog of some 155,000 requests for space heating. Included in the 1958 plans are further improvement of underground storage facilities near Allegan, Michigan.

Gas Division of New England Electric System has several projects underway or slated to begin in near future. NEES Gas Division subsidiaries and their programs, include: **Lawrence Gas Company,** Lawrence, Massachusetts, 7600 ft of 6-in. high-pressure main,



the easy way... *the Dresser way*

This photograph, taken of a section of Consolidated Edison (New York City) gas main, shows that where you have to make a lot of connections in a limited space, Dresser Couplings provide three exclusive advantages:

First, you can handle up to 4-degrees of deflection at each joint . . . which gives you considerable leeway in lining up the pipe. Shop-fabricated fittings can be easily inserted into a rigid piping set-up, and Dresser Couplings eliminate problems of line-up.

Second, you don't need exact lengths of pipe. The Dresser Couplings span short gaps between pipe ends and give you permanent, gastight joints without exact pipe fitting.

Third, you only need room to get in with a wrench to tighten the bolts on a Dresser Coupling.

For every installation or extension of mains and service lines, there's a Dresser Coupling designed to make the job easier, faster and cheaper. The Dresser method eliminates many pipe joining problems, makes permanent gastight joints every time. Why join pipe the hard way? . . . when the Dresser way is so much easier and less expensive.

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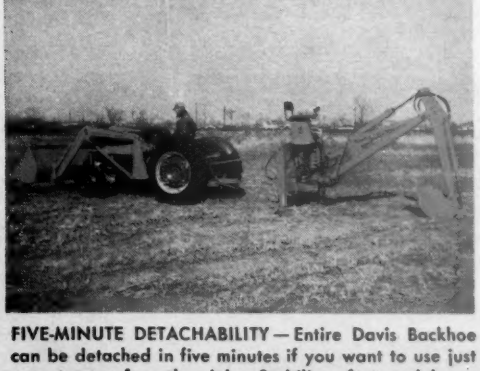
will get you out of a pinch!

CLOSE-IN DESIGN OF DAVIS LOADER — Provides excellent visibility. It packs the power to take big bites. Sturdy box-frame arms have long reach for discharging loads into fill holes, piles, or high-bed trucks. No wonder, Davis is the one others follow.



FIVE-MINUTE DETACHABILITY — Entire Davis Backhoe can be detached in five minutes if you want to use just your tractor for other jobs. Stabilizer feet and boom form tripod so unit is ready for immediate re-attaching.

The exclusive features, superior maneuverability, and wide-range visibility of Davis rigs let you operate under "pinched" conditions impossible for other rigs... increase your profit potential by eliminating expensive hand digging.

Visibility to Operate in Tight Quarters — Davis works best in close quarters because you don't have to "feel" your way. Low Loader silhouette, location of seat provides excellent view of where you are working.

Sets Up in Places Inaccessible for Other Machines — Exclusive flush digging and continuous 200° operating arc of the Davis 210 Backhoe lets you operate efficiently in places where you would otherwise have to use expensive hand labor. No other machine could work there.

Alert Controls Permit Precision Operations — Independent controls are mounted in convenient fingertip locations that allow you to always face the job. They respond lightning-fast to your command.

Davis Loaders and Backhoes are available for all popular models of International, Ford, Fordson Major, Ferguson, Case, Massey-Harris, Allis-Chalmers, Oliver, John Deere, Minneapolis-Moline, and Work Bull Tractors.

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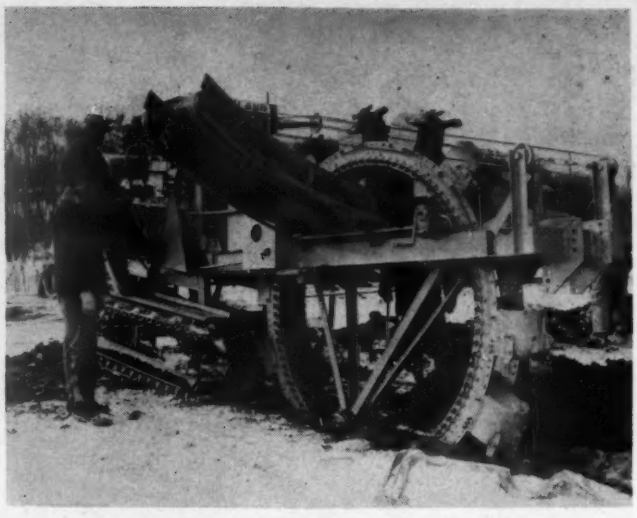
Trenching for installation of 4-in. high-pressure main to serve a large industrial customer in Cedar Rapids, Iowa. Iowa-Illinois Gas and Electric Company uses modern trenching equipment to speed construction projects such as this.



Snow and below-freezing temperatures are no deterrent to the Blue Island operating department of Northern Illinois Gas Company. Mechanized ditch-digging — even in the winter — facilitates installation of new mains and services.

along with construction of regulator stations and joint clamping, in Lawrence and Methuen, estimated to cost $150,000, work to be contracted, estimated completion date, December, 1958; also 1375 ft of 6-in. low-pressure main in Andover, estimated to cost $7600, to be contracted, work to begin in April 1958. **Mystic Valley Gas Company,** Malden, Massachusetts, has completed work on 650 ft of 6-in. low-pressure main, costing an estimated $6200, in Arlington, work done by contractor.

Columbia Gas of New York, Inc., Pittsburgh, Pennsylvania, plans construction in the Endicott, New York, area in 1958 of 5200 ft of 8-in. and 21,200 ft of 12-in. high-pressure system. Estimated cost of the project is $234,000, with job to be contracted. Work is to begin in August and completed in October.

Arizona Public Service Company, Phoenix, Arizona, plans to spend more than $3,500,000 in 1958 for expansion of its natural gas service facilities. Included in the expenditures are gas main extensions, new gas services, main replacements, and other improvements to existing facilities. Largest single item in the company's gas system construction program, indicating the population growth expected in its area, is $2,000,000 budgeted for new gas services and mains to connect 12,000 customers.

New Jersey Natural Gas Company, Asbury Park, New Jersey, in 1957 spent a record $3,069,151 for new construction to provide service to new customers and keep abreast of anticipated growth in its service area. The company added 5231 heating customers during the year.

North Shore Gas Company, Salem, Massachusetts, has underway 2000 ft of 4-in. high-pressure main in Peabody, estimated at $12,000, to be completed in April, and 2600 ft of 6-in. low-pressure main in Beverly, estimated at $11,150, to be completed in May, both jobs by contractors.

Central Illinois Public Service Company, Springfield, Illinois, has under construction 46,400 ft of 2, 4, and 6-in. intermediate pressure gas distribution system in Mason City, Illinois. Job, contracted by L. R. Young Construction Company, is expected to be completed in May.

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100,000 feet of trench in eight months on scattered jobs—that's what a Barber-Greene ditcher delivered for a Midwest utility company.

12 Barber-Greene ditchers travel 800 miles ... dig 100 jobs daily

To speed up house service installation, a Midwest utility, name upon request, bought three Barber-Greene Model 711 Ditchers. These ditchers paid off so well that nine more similar units with variations in boom design were soon added to meet the growing need for fast service trenching in the 250 different communities served by this progressive utility. This fleet of 12 has dug over 625,000 feet of trench in less than a year. As a result of this performance record, four more of these versatile ditchers have been added to the line—boosting the total to 16.

Here are some of the features of the Barber-Greene Model 711 ...

Unmatched mobility: Rubber-tired mounting provides fast job-to-job travel. Easy to drive, this Barber-Greene cruises at 45 m.p.h. . . . shrinks distances between jobs.

One-man operation: Once on the job, the operator merely lowers the boom and starts digging. Hydra-Crowd control permits infinite range of digging speeds from 0-13 feet per min.

Greater traction: . . . with four-wheel drive. An important feature when digging on slopes and hillsides or on soft, muddy ground that often surrounds new housing projects.

Saves lawns and curbing: Low bearing pressure and proper weight distribution offer real protection to lawns, sidewalks and curbing. Low height prevents entanglement with trees.

This is just one of five different Barber-Greene ditchers, each designed to cut costs on a wide variety of jobs.

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

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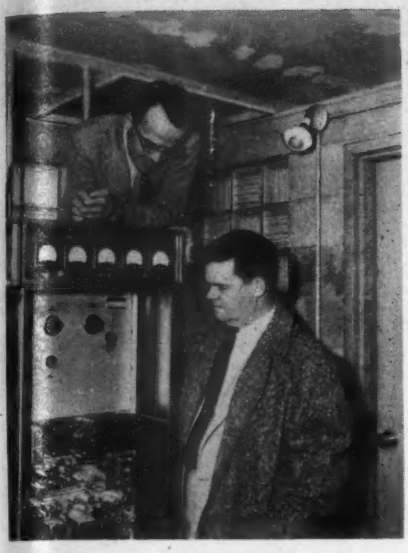
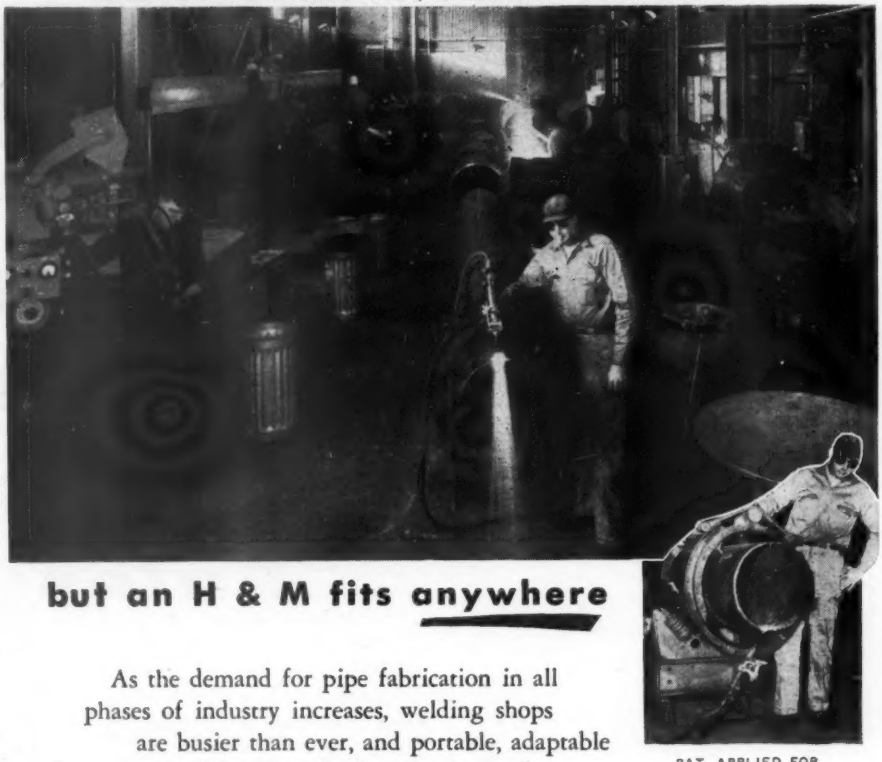


Operation of 250-watt transmitter at Ohio Fuel Gas Company's new central base radio station is discussed by Paul W. Rogers, right, vice president and chief engineer, and Arthur R. Goodman, communications superintendent. Outside, a 300-ft tower beams signals to Ohio Fuel offices and mobile units throughout the state. The new station was constructed at a cost of about $17,000. Ohio Fuel's FM radio network consists of 27 base stations and 162 mobile units in company trucks and cars. The company first installed a two-way radio system in 1949 with the original base station in east Columbus. Increasing electrical interference at that site made necessary the new tower and transmitting-receiving equipment near New Albany — one of the highest points in Ohio with an elevation of 1230 ft above sea level. The new base station operates automatically. Radio signals are relayed to it by microwave.

The Manufacturers Light and Heat Company, Pittsburgh, Pennsylvania, has two major projects scheduled for construction this summer in Ohio. At Wintersville, construction involves 18,625 ft of 6-in. intermediate pressure system, costing $107,000, work to be contracted, with project to begin in May. At Steubenville, 44,800 ft of 8-in. intermediate pressure system, costing $388,000 will be built, with job to be contracted and work to begin in June. Projects recently completed by the company include 9400 ft of 6-in. intermediate pressure system in East Liverpool, Ohio, by Baughman Contracting Company, at cost of $59,000, and 3010 ft of 16-in. main on intermediate pressure system in Pittsburgh, at cost of $75,000, contracted by Rich and Company, Inc.

Mountain Fuel Supply Company, Salt Lake City, Utah, plans to spend approximately $4,000,000 in 1958 to add an estimated 10,000 new customers in its service area. No major extensions of the company's distribution system are planned to handle the new customers as most of them will be connected from areas within or adjacent to present facilities. Approximately 4000 of the new customers are expected in the Logan-Brigham City area, connected to the MFS system late in 1957. That construction included 197,963 ft of 20-in. high-pressure feeder main, to increase supply of gas north of Salt Lake City, at cost of $2,000,000, and 244,846 ft of 12-in. high-pressure feeder main extension to Logan, a new distribution area, at estimated cost of $1,500,000, both jobs contracted by Engineers Limited Pipeline Company. Additionally, 257,996 ft of 2, 4, and 6-in. distribution mains and service lines were completed in Brigham City at an estimated cost of $500,000 by Waterfall Construction Company. In Logan, 460,077 ft of 2, 4, 6, 8, and 10-in. distribution mains and service lines were completed in a new distribution system at an estimated cost of $900,000, with work handled by Engineers Limited Pipeline Company, Hood Construction Company, Kloepfer Construction Company, and Niederhauser Lumber and Construction Company.

STANDING ROOM ONLY!



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The basic segment of that portion of the business known as commercial is the large-volume cooking establishment. Although this business is under-appreciated, it actually is the best business you can get. It is sold at the top rate. It is a constant, non-peaking load. It is located in areas already served by existing gas mains. Its equipment is first-rate and competitive.

The fact that the gas industry still has so much of this business is due more to good luck and old habit than to good management. Appreciation of this business is overdue. We should analyze our commercial cooking business. We should look at it in the light of today's rates and sales. We can't afford to lose it.

The secret of retaining and gaining commercial sales is good commercial service.

East Ohio Gas Company has designed its commercial food service around six practices. They are:

One: Train men who are experts at commercial cooking service and make this their prime responsibility.

Two: Schedule every commercial cooking establishment for a periodic service call, depending on type and size, whether the establishment asks for the service or not.

Three: Maintain close personal contact between the commercial salesman and the commercial service man. Make it easy for them to talk to each other.

Four: Have the service man present at the installation of all major commercial gas equipment, no matter when the installation is made.

Five: Provide the services of a full-time dietitian.

Six: Participate in trade associations and industry exhibits.

This program has been a leading reason for the company's success in developing and holding a high percentage of the commercial cooking business in its area. It can do the same thing for you.

Here's a SIX PART PROGRAM for

Building and Holding Commercial Sales

John S. McElwain
General Sales Manager
The East Ohio Gas Company
Cleveland, Ohio

COMMERCIAL COOKING is not just good business to have — it's probably the **best** business you can get.

First, it is generally sold at the top rate. Therefore it is a top revenue producer per Mcf.

Second, it is a constant, non-peaking load. People eat just as much and just as often in July as they do in January, and today, with air conditioning, they eat out just as much in August as they do in April. Gas for commercial cooking is sold 365 days a year, and usually it is sold with a relatively equal pull through the daytime hours.

Third, most food preparation centers are generally situated in populated areas. A distribution system exists. You don't have to build fantastic line extensions to get the business.

Finally, the tools of commercial cookery — the gas-designed cooking equipment of today — are produced by many sound and solvent manufacturers. Equipment is being constantly improved and re-designed to make it more competitive with electrical cooking equipment, both in cost and in performance.

In short, this business is too good and too valuable to lose. I know of no faster or more certain way to lose it than by concluding, in a spirit of complacency, that we **cannot** lose it. When that happens, we will wake up some morning to discover that the opposition has been in the house and has ridden off with the family fortune.

Our electrical competitors are scheming hungrily for all forms of base load electrical business. They, too, are in the business of supplying energy, and if this commercial cooking load is profitable for us, it certainly must be profitable for them.

Heart of the commercial business is concerned with large volume food cooking and preparation. This business may be located in a restaurant, institution, club, factory cafeteria, school, church, or a small independently operated bakery.

We have always taken this portion of our commercial business for granted. We have accepted it as something that is our due. In many cases we have done little to get this business and even less to encourage it. We have generally not even recorded it. I would venture to say that very few companies can get, from existing records, the exact volumes of gas they are selling to food preparation centers for food preparation.

Despite this general attitude, the gas utilities still do have this business. Competition has made inroads in some parts of the country with the commercial electric range, electric fryer, and electric bake oven; but generally they have been less successful with these annoying devices than they have been with their domestic cousins, the household electric range and electric dryer. Competitive restaurant owners who

must render good service, supply fine food, and do both of these at a profit, accept commercial gas cooking in most cases as the best method of doing a difficult job.

Chefs Like Gas

The fact that we still have the business is something for which we cannot take much credit. The reasons have been bound up with comparative costs and with long-time habit. A husband may say, "My wife does the cooking, and if she wants electricity, that's O.K. It only costs a few cents more anyway." **But the average restaurant owner is struggling to make a profit on a small margin, and he can't afford to ignore those "few cents" and pamper the whim of a chef who wants electric cooking.**

Fortunately, few chefs want it. The average chef has been accustomed to cooking with gas. If he is a good chef, he is a creative artist, and that means he is probably somewhat temperamental. He has enough problems with his sauces and roasts without trying to adapt himself to a new and different piece of equipment or method of cooking. In many cases, of course, he has made a test of gas and electricity and prefers gas for its positive control, its flexibility and speed, and its economy.

From these comments, it would appear that we can draw the following conclusions: *The commercial load is good, stable business to have. It hasn't been a hard business to get and we really haven't had much trouble holding it. Therefore, let's just coast along and not borrow trouble.*

In my opinion, these conclusions could not be more wrong. They will rise up and haunt us one day if we don't take a clean, clear look at the commercial cooking business, and act in accordance with our findings.

Service Is Essential

The answer, as we see it, is to take the same basic step that first occurs to any prudent business man who wants to hold business that is threatened. It is the secret of protecting any business, not just gas business. I am talking about **service.**

Now, in commercial cooking sales, there is **service** — and *service*. You can try to do as little of it as possible, and do it in a half-hearted manner with casually trained personnel whose real responsibilities lie elsewhere. Or you can depend upon the manufacturer of the equipment to do it — maybe. Or you can turn it over to a service company in your area. Some of these companies do a fine, conscientious job, some give the work a lick and a promise, and others do a poor job. But in any event, these companies are interested in service and not in sales.

Stressing importance of commercial business, the AGA-sponsored Combined Commercial Gas Exhibit was largest at the 1957 Hotel Show held in New York City's giant Coliseum. Exhibit featured all types of gas commercial equipment, covered nearly 4000 sq ft.

On the other hand, you can provide service with trained specialists on your own payroll. You can act as though every concern of the restaurant manager or institution head is your own concern. You can let him know that his business is something you want and can't afford to lose. This is the way East Ohio Gas does it, and this is the program to be described here.

Our program has paid off. We are holding more than 95 percent of our commercial load from year to year. The major institutions and restaurants in our area cook with gas. There may be an electric fryer here and there, but basically the accepted method is gas.

We attribute this record to our commercial sales and service organization. This set-up is available to any gas distributing utility. It can be introduced without great cost into any company's operating department and sales department.

Our food service policy is built around the following practices:

● **First, we don't use general customer service men for restaurant and institutional service.** Instead, we build a man who is an expert in commercial cooking. After we have him trained, we don't limit him to adjusting the air shutter on a couple of top burners. He is set up so that he can completely service the equipment, adjust thermostats, replace valves, and do other minor mechanical service on the equipment. He is also kept abreast of new developments and improvements in commercial equipment. His continuing education is accomplished at the regular twice-a-month meetings of the sales force with the service force, by attending service schools frequently, and by working on actual demonstrations with new equipment.

All the service described, of course, is rendered free of charge.

Perhaps your company would not have enough commercial work to keep this man busy 40 hours a week. In that case, let him spend his extra time on residential service or some similar occupation, but at the same time make his principal and primary responsibility the servicing of the commercial business in his area.

● **Second, we don't wait for the commercial customer to call us in for service.** We have established a pattern of service requirements for all of our commercial customers. We schedule every commercial cooking establishment for a periodic call, depending on type and size.

The bar with a hot plate doesn't need a service call every 30 days. We do feel, however, that it will do us a lot of good, and not take too much time, if our customer service man looks at that hot plate every six months, or at least once a year.

On the other hand, we do feel that the kitchen in the principal hospital or in the leading hotel warrants our attention at least once a month. The gas equipment installed in either of those kitchens probably cost between $5000 and $10,000. The gas load is substantial.

To be more specific, our schedule calls for one group of institutions and restaurants to be serviced every 30 days; the second group to be serviced every 90 days; the third group, every six months, and the fourth group, once a year.

One point to remember in this connection is that *the frequent service calls tend to reduce the extent of the service actually needed.* When you check an installation every 30 days, you correct small failures before they become major catastrophes. The first call, to be

sure, may run into some time and straightening up, but those which follow it are generally much simpler as a result of good work already performed.

● **Third, we believe that there must be a commercial salesman or commercial technician in the sales department** who is responsible for the same group of institutions that are receiving commercial service. The functions of this salesman or technician should be familiar to all of you. He calls on the owner frequently, and he maintains liaison among the owner, equipment manufacturer, equipment distributor, and equipment distributor's salesmen. He must have some knowledge of layout and be able to work up proposals and comparative operating costs between gas and electric equipment. He must know how a restaurant and hotel kitchen works. He should be able to make recommendations of value to the owner in both operating procedure and in design.

Assuming that we have such a man, or such men, in the sales department, then we come to the most critical part of the whole operation. There must be constant contact between the sales department representative and the service department representative.

When I speak of contact, I don't mean contact in the form of a routine report written out on Form AX-201-Y4, with six carbons. I mean **personal** contact between the customer service man and his counterpart in sales.

Purpose of this contact becomes obvious when it has once been thoroughly tried. The commercial service man goes out on a call and finds improperly operating equipment, which he puts in shape as best he can. He finds equipment which cannot be easily and adequately repaired. He runs into a situation where the chef expresses an interest in gas equipment or the owner states his desire for an electric range. He transmits all this information, immediately and verbally, to the sales representative — who knows what to do next. Sales moves into the picture and secures the continuation of the commercial load by providing the owner with all the help he needs in getting the new equipment he probably wants.

In our company, our service people work under and report to the operating department. However, conferences are set up so that the sales personnel and the commercial service personnel meet twice a month for possibly only an hour and jointly work out commercial cooking problems of the restaurant and hotel owners. In the small divisions the commercial service man and his counterpart in sales get together as often as they need to. Both sides of the organization chart are vitally interested in this business and there is thorough and complete cooperation between them.

● **Fourth, during the installation of all new major gas equipment, the customer service man and the company salesman should be present.** Their services should be visibly available to the purchaser, the manufacturer-seller, and the plumber. Unfortunately, the nature of commercial cookery is such that these installations are often made at odd hours of the night, and generally on a night during the weekend. The customer service man should still be there.

Installation and final inspection of a battery of ranges or of a totally new layout in the local hotel's kitchen represents the completion of a large and thoroughly explored expenditure. It is a matter of some importance to the chef and the owner. *It should be a matter of importance to us.*

● **Fifth, in each of our two largest metropolitan areas we have a full-time commercial dietitian.** They do extremely valuable work for us. Our dietitian works with the dietitian of the hotel or restaurant in a common effort to make better use of the available equipment. She helps the church or school which has no dietitian. She suggests group-feeding plans, develops low-cost meals, and makes herself generally indispensable in matters pertaining to efficient and profitable mass feeding.

In one case, the local sheriff and warden asked our dietitian to prepare a nutritional plan for the jail kitchen. The commissioners had appropriated a modest amount of money and I can assure you that this was quite a task. These girls are frequently asked to prepare dietary schedules for charitable institutions and small hospitals which cannot support their own dietitic department.

You may ask, "What has all this got to do with selling gas?" One thing only — never underestimate the power of a woman. The dietitian in a hospital or institution is the focal point of most equipment purchases. It helps if they are on your side when the decision is made. We find that such dietary service comes back to us in plusses when kitchen equipment is being chosen. Our church contacts have been particularly valuable.

● **Sixth, we recommend that you have your commercial sales people join the local chapters of the Stewards and Caterers Association, National Restaurant Association or whatever counterpart of these associations exists in your area.** We suggest they should be active members and attend all business and social meetings, clam bakes, picnics, and outings.

They should participate in area State Restaurant Association shows, State School conferences and exhibitions, State Hospital and Institutions exhibits. If you are not a large gas company, you can combine with other gas utilities to take space at these exhibits. In short, **it is important to be a part of the restaurant and hotel business, not just a supplier.**

To give you an idea of the way we staff this operation, here is an outline of the set-up in our major divisions.

In the Cleveland division there are 2200 restaurants, hotels, hospitals, institutions, and schools. The sales department covering this group of commercial accounts consists of two supervisors, five salesmen, and one dietitian. This gives a loading of approximately 300 units per man. Supervisors carry a work load as well as the men. Naturally, it is not as heavy and consists of the principal accounts and contacts with equipment manufacturers and dealers. Supervisors are also charged with the responsibility of making customer calls with their technicians.

Because of the differences that exist between commercial restaurants and charitable or government-supported institutions, we separate them for the purposes of sales contact. One supervisor and four men handle the restaurants, hotels, clubs, and industrial cafeterias.

One supervisor, one technician salesman, and the dietitian are responsible for maintaining all sales contacts with institutions, hospitals, and schools. This institutional group is also responsible for maintaining all liaison with architects and designers who prepare the drawings and specifications for institutional kitchens and cafeterias.

The operating department has assigned one supervisor and six commercially trained customer service men to this activity. This gives us a loading of 350 commercial accounts per man.

Three percent of our accounts, or approximately 70 accounts, are contacted and serviced by the customer service men each and every month. Sixteen percent, or approximately 350 accounts, are contacted every 90 days. Forty-seven percent are serviced every six months, and the balance once each year. The average service call is not one of great complexity, but the representative is charged with checking each individual piece of gas-burning equipment and the accuracy of all thermostats.

Acknowledgment

This article was adapted from a presentation made at the AGA Annual Convention, St. Louis, 1957. ★ ★

New $1,500,000 particle board plant of Gray Products Company, Inc. uses natural gas in its process to make small wood particles into smooth boards.

Load Building

Gas Fuels New Building Board Plant

In Virginia

High efficiency, accurate heat control make gas ideal fuel for new building material industry plant

NATURAL GAS IS FLOWING into a new $1,500,000 GRACO flakeboard plant in Waverly, Virginia, helping to activate giant presses that squeeze small wood particles into smooth, sturdy boards. A special three mile main was constructed by the Commonwealth Gas Distribution Corporation, subsidiary of Commonwealth Natural Gas Corporation, to serve the new plant and the Waverly area. Principal uses of natural gas in the plant are for steam generation for the big presses and to provide heat for the wood particle dryers.

GRACO's new plant was located near the gas main so that natural gas could be used in the new wood processing system. Natural gas is ideal for this operation because of its high efficiency and accurate heat control qualities. The plant will turn out approximately 25,000,000 sq ft of ¾-in. equivalent particle board each year, making it one of the top producers of this material in the country.

By utilizing a high percentage of every tree and by being able to use small trees from forest thinnings, the process employed at the new plant will contribute greatly to the conservation of Virginia pine timber. Trees used by the Gray plant will be replaced in 15 years through replanting of pine seedlings.

Wood particle board serves as a new type core and panel in the product manufacturing processes of the furniture and building industries.

The sheets of particle board are pressed into form under 275 psi. To obtain the wood particles, freshly cut pine logs are chipped into small flakes. The flakes are then gas-dried, treated with a high strength, thermosetting resin binder, and pressed into shape.

Some of the superior qualities of particle board include: Uniform density, high screwholding ability; high rigidity; warp resistance; knot-free structure and a flat, smooth surface that takes a finish easily. * * *

"OPELIKA"
—SERVICE BOXES

For our GAS ENGINEER Friends —

SOMETHING NEW HAS BEEN ADDED!

Designed to prevent electrolytic corrosion, here is that insulated SERVICE BOX you have been looking for — "A Buffalo-Type, cast iron box with butyrate plastic cock housing."

For prices and other information — write

OPELIKA FOUNDRY CO.
INCORPORATED
P. O. BOX 326
OPELIKA, ALABAMA

Home Fires Kept Burning

A fast experiment forestalled curtailment of gas service to some 600 customers on the southernmost end of Peoples Gas distribution system when unusual weather made Florida thermometers dip to a 26 low in Greater Miami and gas sendout soar to a 117 percent in the first five days of February.

In a race against the mercury, operations personnel lashed one 1,000 gal. and three 500 gal. propane tanks to a truck and trailer, pumped them up to 100 psi with manufactured oil gas and hauled them to Star Island in an effort to feed gas back into the low pressure area of the distribution system and avert a shutoff of service. They were successful — by repeating this operation twice a day during morning and evening peak hours for five days, not one customer lost gas service.

Credit for the idea and its execution goes to Charles W. Davis, operations director, and Newton H. Bollinger, gas engineer, of the Peoples Water and Gas Division of Miami, Florida.

New Rockwell Plant Operating

Rockwell's new 180,000 sq ft valve plant at Kearney, Nebraska, is now in limited production. Approximately 75 employees are already at work in the new plant which manufactures Rockwell-Nordstrom lubricated plug valves for the natural gas and other industries. The new $2 million plant is a one-story brick and tile structure located on a 52-acre plot. Valves will be completely machined, assembled and tested there.

Sputnik theme has been effectively used by the Peoples Natural Gas Company of Pittsburgh in its Gateway Center display window. By means of a battery apparatus a gas flame orbits the world globe suggesting that gas fuel is a modern and universal favorite. Idea was promoted by the Peoples gas department and attracted widespread attention in the Pittsburgh area.

A Stitch Ahead of Time

Peoples Natural Gas Company, serving over a quarter million customers in western Pennsylvania, is making detailed plans on how to meet a situation it hopes will never occur. It is deciding now who will do what and how in event of an emergency. Vice president Christy Payne, Jr., heads the emergency procedures committee that is considering in broad outline the emergency preparation phases such as administration, security, communications, public relations, damage control, records preservation, purchasing procedures, and emergency transportation, housing and feeding facilities. Studies currently include alternate sources of supply, availability of emergency equipment, type and extent of emergency communication facilities, and procedures for aiding vicinity newspapers in getting full and continuing account of developments. Ultimate objective is to make Peoples Gas master of any major emergencies that may affect the company.

Cash for No-Crash

Brooklyn Borough Gas Company has kept its number of preventable automobile accidents down to two during the year 1957. In recognition of this accomplishment, each of the 84 authorized drivers of the company was presented a $25 U. S. Government Savings Bond. Brooklyn's record placed them in first place in the Greater New York Inter-Fleet Accident Reduction Contest for 1957.

Analyzer Goes to College

Standard Electric Time Company has donated a McIlroy fluid network analyzer to Western New England College for use in the science building to be built soon on the new campus in Springfield, Massachusetts. Students will use it to study design, operation, and application of analog computers. Unit will be available to municipal or commercial companies on a rental basis for working out problems. Also it will be available to Standard Electric for similar computations. Western New England becomes one of only four universities to have such a computer. Tufts, Cornell, and the State College of Washington are the other three.

Plant Expansion Completed

Roots-Connersville Blower, Division of Dresser Industries, Inc., has just completed a major expansion of its main plant to provide 40,000 sq ft additional space for production of type AF rotary positive blowers, type XA rotary gas pumps and rotary positive displacement gas meters.

New Department Stresses Development

Dresser Manufacturing Division, Dresser Industries, Inc., has newly organized its product engineering department aimed at developing new and revised products in Dresser's regular product line. John T. Dunton and Howard Hoke have been appointed engineering managers in charge of pipe joining products and service fittings, and pipe repair products respectively. Newly appointed customer service engineer, Thomas O'Hargan will evaluate customer's requests for adaptations of regular products.

One of the largest gas range plants in the world began production recently of 1958 Roper gas ranges. The Kankakee, Illinois, plant is owned by Geo. D. Roper Corp. and its parent firm, the Florence Stove Company. All new Roper 20, 30, and 36-in. gas ranges are now being built in the Kankakee factory. Manufacture of 40-in. models will start in April with Roper's Rockford, Illinois, plant continuing to produce them until then. Full production capacity of well over 1000 ranges per day is expected in early summer.

Oil-Gas Plant Bid Sayonara

Portland Gas & Coke Company plans to shut down its by-products operations early in 1958, reducing its oil-gas plant in North Portland to a minimum standby facility and reducing payroll by about 250 jobs, nearly one-fourth of the company's total. This decision was reached, explains Executive Vice President James F. Bell, because marketing prospects for petrochemicals, particularly electrode pitch used by the aluminum industry, were so weak that heavy operating losses at the plant would have been inevitable.

Portland Gas made an intensive effort to keep its plant going on a year-around basis by transforming it into primarily a petrochemical operation. However, a major shift in defense spending was a factor leading to a consequent decline in the market for chemicals produced. Gasco's largest job reductions will take place after April 1, and the plant will be on a standby basis by mid-June under present plans.

M-F Industrial Territories. James P. Dreiling, assistant sales manager of Massey-Ferguson Industrial Division, joins newly appointed regional industrial sales managers for the division in examining over-all sales territories. From left, Dreiling, C. J. Workman, eastern regional industrial sales manager; Bill Talmage, central regional industrial sales manager, and John Vilven, western regional industrial sales manager.

50,000th Customer. Piedmont Natural Gas Company recently installed a 14-kt. gold plated meter in the home of their 50,000th customer, Mr. and Mrs. Harold F. Klinge of Charlotte, North Carolina. Participating in the ceremonies celebrating the milestone of service were N. C. Murray Hitchcock of American Meter Company who presented the gold meter to Buell G. Duncan, president of Piedmont Natural Gas, as vice president J. J. Sheehan; measurement superintendent H. F. Cain, and R. J. Nery, representing the North Carolina Utility Commission looked on.

Giant Mechanical Brain has been given to Tufts University in Medford by 17 Massachusetts gas industries. Representing the group is Worcester Gas Light Company president Richard G. Rutherford (left). Shown explaining some of the capabilities of the McIlroy Fluid Network Analyzer to Rutherford and to Ashley Campbell, dean of Tufts College School of Engineering (right) is pretty Judith Ann Keller, outstanding student of engineering at the school. Use of the machine by engineers will eliminate long mathematical calculations and quickly determine size and location of future service mains.

Measurement Course Announced

The 1958 Southwestern Gas Measurement Short Course, to be held April 15-17 on the North Campus of the University of Oklahoma, will include 91 classroom periods of 50 minutes each, covering a program of study including measurement, regulation, accounting, and related subjects.

Gas Lighting Rekindled

Arkansas Louisiana Gas Company has begun quantity production on an outdoor gas light called the "Gaslite" at the Arkla Air Conditioning Corporation plant in Evansville, Indiana. Response to an initial advertisement says W. R. Stephens, chairman of the board, "has been overwhelming and has opened up to us a whole new viewpoint as to the possibilities of building a gas load with what was considered a 'dead' gas appliance. In view of the fact that in our area the 'Gaslite' in 24-hour operation uses about the same volume as a gas range, we envision a tremendous potential new load for ourselves, and for the industry." The gas light is advertised for use on patios, along driveways, porch lighting and step lighting.

GAMA Names 7 New Members

Seven companies have been elected to GAMA membership. They are: Anthes Imperial Company, Ltd., Arkla Air Conditioning Corp., Comstock-Castle Stove Company, Hasche Engineering Company, McQuay-Norris Manufacturing Company, the Montague Co., and Standard Connector and Manufacturing Company.

Gas Popularity Growing

Nearly all new homes built in the Greater St. Louis area use gas heat and gas water heaters, a continuing survey conducted by Laclede Gas Company reports. Perfect or near perfect saturation in heating and water heating is reported month after month in surveys of new construction on company lines by Laclede's market research office. For December, the results were: Householeating, 99.6 percent; water heating, 100 percent.

More and more new homes in the St. Louis area are equipped with gas built-in ranges, according to the survey. Of all new housing surveyed during December, 40 percent had either gas or electric built-ins. Of this amount, the ratio of gas to electric was 2 to 1. For November the built-in saturation was 38 percent. This compares with an 18 percent proportion of built-ins in new homes surveyed during December 1956, and 22 percent for November of that year. The proportion of gas to electric at that time was somewhat less for gas.

Gas dryers are continuing to sell considerably better than the national average, the survey reveals. Monthly checks during 1957 showed margins of less than 1½ to 1 in favor of electric. This compares with a national average of about 2½ to 1. During December, 16 percent of new homes surveyed had gas dryers, 21 percent electric. In December 1956, the dryer saturation in new homes surveyed was 12 percent gas and 16 percent electric.

Veteran Valves Sought

Norwalk Valve Company has instigated a search for the oldest Connelly and Norwalk valves in continuous operation for the longest number of years in celebration of its more than 80 years of manufacturing and servicing gas and air control valves. Awards offered are for $100, $75, $50, and $25 for information on the location of the old valves. Connelly valves, first manufactured in 1876, were incorporated into the Norwalk line in 1945, and all products are now distributed under the Norwalk name.

Norwalk products are distributed by its affiliate, Gas Consumers Service, currently celebrating its 80th year of continuous maintenance service of gas equipment and appliances. Founded in 1878, the affiliate is the oldest and largest independent gas equipment servicing organization in the U. S.

Industrial Silencer Division of Burgess-Manning Company has moved to a new modern plant in the Brookhollow industrial district of Dallas, Texas. This move represents greatly improved facilities in all departments and includes an air conditioned development laboratory in which studies can be made of field problems relating to noise, flow of gas in pipes, and liquid separation.

News Notes

Under an exclusive licensing agreement, Metalbestos gas vent pipe and fittings, manufactured in this country by William Wallace Company of Belmont, California, will be manufactured and distributed in Canada by Selkirk Metal Products, Ltd., of Winnipeg, Manitoba, and Selkirk Metal Products (Eastern) Ltd., of Brockville, Ontario.

Appliance figures released by the Gas Appliance Manufacturers Association show built-in model gas ranges continue to gain in popularity, accounting for nearly 10 percent of total 1957 gas range shipments. The 195,200 units shipped represent 19 percent gain over the 164,100 shipped in 1956. Total for both freestanding and built-in ranges dipped to 1,970,900—a 9.4 percent decline from 1956 shipments. Percentagewise, free standing ranges declined 11.7 percent, while built-ins climbed an able 19 percent over 1956.

Latest concepts in the engineering design, installation, and service of gas air conditioning equipment were discussed by 57 representatives of 15 gas distribution companies in Shreveport, Louisiana, recently at a Western Area round-table conference sponsored by the Southern Gas Association. Items of discussion at the meeting, chairmanned by W. A. Collins, Jr., of Lone Star Gas Company, Dallas, included methods of obtaining and training service and engineering personnel, particularly for new companies entering the gas air conditioning field; maintenance of humidity control; noise reduction; economics of service work; use of plastic pipe for condensing and make-up water lines, and similar topics.

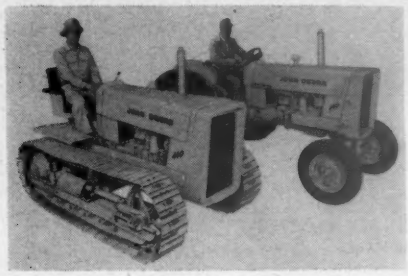
GEM Committee Officers. C. H. Abbott, treasurer of Sprague Meter Company, has been elected chairman of the GEM Committee and K. R. D. Wolfe of Fisher Governor Company, has been named vice chairman. Other committee members are Paul Kreuch, Rockwell Manufacturing Company, and E. C. Hemes, Vulcan Rubber Products division of Reeves Bros., Inc. Abbott succeeds C. Benson Dushane, Jr., American Meter Company who was named one of the members of the GEM operating committee.

New Equipment

FOR THE GAS DISTRIBUTION INDUSTRY

For more information on items described here in brief, use the handy reply card and circle the corresponding numbers

Two New Industrial Tractors—a crawler and a wheel-type—and several new major items of matched working equipment have been announced by John Deere In-



dustrial Division and are now on display throughout the U. S. and Canada. Noteworthy feature of the new 440 series tractors is the combination of clean-cut, aggressive lines with new heavy-duty, well-balanced construction throughout, evident in new protective front grille and extra-heavy cast grille frame, requiring no extra guard; room provided between the grille and engine on new crawler tractor for front-mounted, crankshaft-driven pumps; streamlined, full-view hood of heavy steel plate, and side frames of extra-heavy welded steel construction.

Crawler is mounted on two heavy steel cross members that absorb punishing shocks and stresses from front-mounted equipment such as loaders and bulldozers. New strength and durability have been designed into power train and track assemblies of the crawler, while single track-tension springs provide ease and accuracy of adjustment. Other features include large, protective, adjustable, foam-rubber padded seat, and clutch-brake steering—the latter a feature insuring a high degree of maneuverability in all working conditions. Wheel-type tractor has a new heavy-duty front axle and support. Built-in power steering for this model is optional. A new clutch-type directional reverser is optional equipment for both 440 series tractors. This device permits operator, with a touch of the lever, to go ahead and back up in the same speed without shifting transmission gears. Directional reverser is available for both crawler and wheel-type tractors equipped with 4 or 5 speed transmission. Other optional features include 3-point hitch, hydraulic controls for all needs, special mufflers, electric lighting, etc. Tractors are powered by 30-hp valve-in-head engine.

New accessory equipment includes loaders for the 440 crawler and wheel-type tractors, inside and outside-mounted bulldozers, and a side-boom. *Deere and Company.*

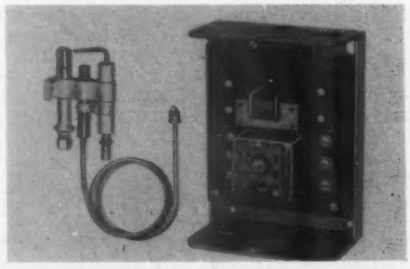
CIRCLE (37) ON THE REPLY CARD

Pipe Insulator. New plastic insulator—said to be impervious to moisture, corrosion and decay—has been developed by F. H. Maloney Company. Unit represents new concept in plastic pipe line insulators because it combines strength with long life and ease of installation at a competitive price. Designed to absorb load shocks and provide cathodic protection at pipeline crossings, insulator is available in sizes from 2- to 36-in. Composed of glass fiber reinforced polyester, it is compression molded at controlled high temperature and high pressure. Ribbed inside to prevent cold flow of the pipe wrap. Insulator has been extensively field tested, laboratory tested in excess of 18 tons and temperature tested in excess of 400 F in boiling hot-pipe-coat (pitch). *F. H. Maloney Company.*

CIRCLE (38) ON THE REPLY CARD

Home Gas Filter. New filter has been designed to remove dirt, pipe scale, and other foreign matter from natural gas lines and keep customers appliances operating efficiently. Filter is installed in customer's home, upstream from the meter on low pressure systems, downstream from the meter in front of the regulator on high pressure systems. Is designed for maximum safety. Once installed unit stays on the line permanently. Has only six parts, is constructed of die-cast aluminum with head and base held together with a single locking bolt, washer, and gasket. Unit's overall dimension is 5¼-in. high and 4½-in. in diameter. Design pressure is 125 psi with capacity of 600 scfh with initial pressure drop of one in. of water. *Dollinger Corporation.*

CIRCLE (39) ON THE REPLY CARD



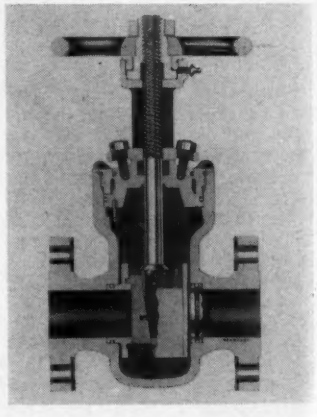
Flame Safety Control. Use of a magnetic amplifier helps the new General Controls safety control present a new concept in flame detection for medium size commercial gas burners. A flame-sensing Hi-Speed thermocouple responds to flame failure in five seconds or less, and the magnetic amplifier operates the switching relay in response to the signal from the thermocouple. Relay unit inherently "fails safe" on power interruption, component failure, or break in thermocouple circuit. New combustion safety relay has been field tested for three years. *General Controls Company.*

CIRCLE (40) ON THE REPLY CARD

Valve Lubrication Handgun. High-pressure hydraulic handgun specially designed for plug valve lubrication is now available from Rockwell. Lighter than conventional guns, unit is self-priming and can be used in any position. Because of extra-high pressure gun exerts, hose and coupler can be locked to buttonhead fitting in the

valve shank; pressure may be relieved by a turn of the by-pass valve on the gun. Other protective features include a relief fitting on hydraulic system to guard against injury to the gun if operator continues to pump after gun is empty, and a 15,000 psi gage to indicate point at which sufficient lubricant pressure has been developed in the valve. *Rockwell Manufacturing Company.*

CIRCLE (41) ON THE REPLY CARD



Valve. Kerotest Manufacturing Company has put into production a new concept in valve design. The new Keroseal is a non-lubricated, optional-flow, double block and bleed full opening valve designed to handle gases, petroleum products, petrochemicals fluids, and numerous other products. New principle of operation eliminates galling or wear at the seating surfaces. Features include a vapor tight seal that is insurance against product contamination; time and labor saving design that permits servicing without removing valve from the line; plus minimum maintenance. Provision has also been made for installation of a bleed valve. Driven either by handwheel, gear, or motor, the Keroseal is operated by raising or lowering a threaded stem. In opening the valve, the counter-clockwise turning of the handwheel first withdraws both upstream and downstream discs from contact with the seat rings in the body before raising them out of position, thereby eliminating drag during the opening operation. *Kerotest Manufacturing Company.*

CIRCLE (42) ON THE REPLY CARD

Deeper Digging Ditcher. Barber-Greene's "Runabout" model ditcher can now dig to a maximum depth of 56 in. This represents an increase of 8 in. in maximum digging depth over the former 48 in. maximum. New longer boom will also cut the full range of widths, 5½-in., 7½ in. and 10½ in., which the "Runabout" has featured since its introduction. Other features include exclusive all-hydraulic infinitely variable, crowding speed control, "Hydracrowd"; 15 mph road speed; optional hydraulically driven discharge conveyor; comfortable all-weather operator's cab and a special differential that aids traction on mud or ice by feeding power to whichever drive wheel may be on firmer footing than the other. *Barber-Greene Company.*

CIRCLE (43) ON THE REPLY CARD

PVC Pipe Fittings. Lightweight pipe fittings of unplasticized polyvinyl chloride (PVC) are now in production by Tube Turns. Fittings match burst strength of Schedule 40 PVC pipe and cost about one-third less than Tube Turns regular line of standard heavy wall industrial fittings currently used. Injection-molded fittings are made of both normal and high-impact materials with the same characteristics of corrosion resistance, non-aging, and easy installation as the heavier fittings. Line includes 90 deg and 45 deg elbows, tees, couplings, and caps in ¾ to 2-in. sizes as well as 3 and 4-in. couplings. *Tube Turns Plastics, Inc.*

CIRCLE (44) ON THE REPLY CARD

Phone Number Selector. New product ideal for service and sales departments of gas distribution companies has been developed by Dial Direct Dex. Phone-O-Matic phone number selector automatically remembers phone numbers, exchange, and area codes for distance dialing. Unit fits over phone dial. Accompanying black and gold index box holds over 180 numbers. By selecting the indexed number disk, placing it in center ring on phone, and dialing each figure as it appears in the lens, it is possible to eliminate problem of hunting up telephone numbers, forgetting them while dialing, or calling wrong numbers. *Dial Direct Dex.*

CIRCLE (45) ON THE REPLY CARD

Heat Treating Units. New features of 1958 Ipsen "B" model straight-through heat treating units include quiet gas burners of alloy construction that operate without tail flames, 100 percent air-gas premix system, new super alloyed ceramic heating tubes, and "Flame-Buster" links, that will withstand temperatures to 2800 F, one piece cast fan and shaft assemblies, cast Meehanite door plates with machined ways to improve sealing, heavier alloy frame inner doors, and new design of refractory arch for increased strength. *Ipsen Industries, Inc.*

CIRCLE (46) ON THE REPLY CARD

God gave man memory, that he might have roses in January.

Hydrogen Atmosphere Furnace. New line of gas-fired hydrogen atmosphere furnaces, with heating chambers up to 14 in. wide by 48 in. long by 10 in. high has been developed by Eclipse Fuel Engineering Co. Furnaces are designed for bright brazing, annealing, and hardening of stainless, tool, and carbon steels without oxidation or discoloration. Work is heated and cooled within a non-oxidizing hydrogen atmosphere supplied by an ammonia dissociator unit that completely dissociates raw ammonia from the atmosphere before it enters the heating chamber. After work leaves heating chamber, it is cooled in a water-jacketed cooling area so that on leaving the furnace it is cool enough to touch. *Eclipse Fuel Engineering Company.*

CIRCLE (47) ON THE REPLY CARD

Lancaster PARTS STAY ACCURATE BECAUSE

THE OIL IS IN THE METAL
No Excess Oil or Grease to Get Stiff and Sticky in Winter!
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Lancaster parts are easy to install and adjust . . . and they maintain their unexcelled accuracy because Lancaster parts have more oil bearing metal surfaces than competitive assemblies.

For accuracy that lasts . . . order Lancaster Main Movements and Index Drive assemblies and Diaphragms with built-in adjustable Carrier Wire Assemblies for your 1-A Sprague Gas Meters.

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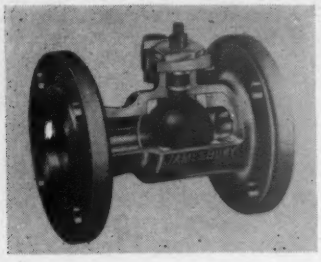
Bulletin Board

NEW BOOKS...BROCHURES...CATALOGS

For more information on items described here in brief, use the handy reply card and circle the corresponding numbers

Small Size Flanged Valves. New line of small size flanged "double-seal" ball valves in ½ to 2-in. sizes has been announced



by Jamesbury Corporation. Smaller size "double-seal" flanged valves are photographically illustrated in a new bulletin with tabulation of parts and approximate dimensions. Features detailed are "unit-body construction," positive shut-off, low torque over complete pressure range from vacuum to full rated pressure high flow capacity with minimum friction loss, and seats and seals that are interchangeable and replaceable. Valves are now supplied with flanged ends in pipe sizes from ½ to 8-in. and with screwed ends in sizes from ¼ to 2-in. *Jamesbury Corporation.*

CIRCLE (81) ON THE REPLY CARD

Gate Valves. New, four-page illustrated bulletin describing Walworth's 150 lb and 300 lb cast steel gate valves has been announced by the Walworth Company. Bulletin lists 10 features of the valves, stressing their durability, easy maintenance and erosion-resistant properties; it also provides dimension and weight charts and line drawings for each type. A large cutaway of a valve shows how stem scoring is prevented through sufficient clearance for the one-piece gland between the gland, stem, and stuffing box. *Walworth Company.*

CIRCLE (82) ON THE REPLY CARD

Steam Thermostats. Rod-and-tube type steam thermostats for use in commercial appliances are described in new four-page bulletin published by Robertshaw-Fulton Controls Company. Model "SC" and "ST" thermostats provide sensitive throttling control for coffee urns, dish washers, sterilizers, steam tables, and similar equipment. Both models provide accurate temperature control in a range between 185 and 220 F. Cut-away and installation diagrams are included. *Robertshaw-Fulton Controls Company.*

CIRCLE (83) ON THE REPLY CARD

Domestic Water Heater Valves. Temperature and pressure relief valves for domestic water heaters are described in a catalog recently published by The Patrol Valve Company. Entitled, "Water Heater Relief Valves, Common Causes for Making Them Operate . . . For Your Protection," the catalog explains the function of these valves, what causes them to operate, and why they may operate when they apparently should not do so. *The Patrol Valve Company.*

CIRCLE (84) ON THE REPLY CARD

Globe Type Needle Valves. Kerotest Manufacturing Company has recently printed a four-page brochure outlining features of the new N-20 and N-28 globe type needle valves. Described are the numerous usages of these valves, pertinent technical data in chart form, features, and cutaway views and diagrams. *Kerotest Manufacturing Company.*

CIRCLE (85) ON THE REPLY CARD

Automatic Gas Safety Shut-Off Valve. Master Poly-Trol unit, a unique new safety shut-off valve manufactured by Handley Brown Heater Company, provides a tamper-proof shut-off that obsoletes contemporary service cocks. May be used as a manual shut-off by removing cap and pulling up the plunger. Also acts as an automatic shut-off in cases of excessive or inadequate pressure caused by failure of house regulator, district regulator or failure of supply pressure, in cases of excessive temperature, or when water level rises a few inches above the top of the unit as in flooding conditions. *Handley Brown Heater Company.*

CIRCLE (86) ON THE REPLY CARD

IGT Study on Air Conditioning, Refrigerating Systems. Results of an extensive literature search on the theory of the closed absorption cycle, applications of the cycle, the chemical and thermodynamic properties of absorbents and refrigerants, and factors to be considered in attempts to develop improved absorbent-refrigerant combinations have been published in IGT Research Bulletin No. 14, "The Absorption Cooling Process – A Critical Literature Review," by R. T. Ellington, G. Kunst, R. E. Peck, and J. F. Reed. Study presents a review of the closed systems currently employed in domestic and commercial air conditioning and tabulations of physical and thermodynamic data for the absorbent-refrigerant combinations used. *Institute of Gas Technology.*

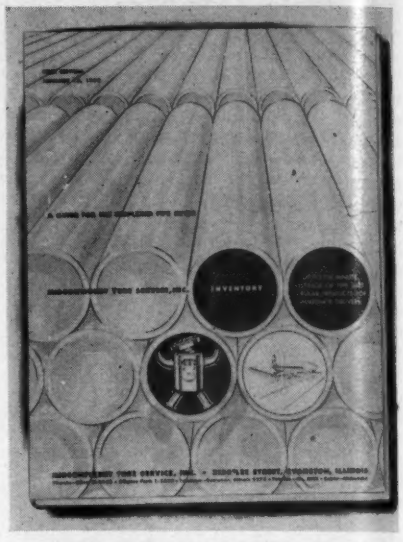
CIRCLE (87) ON THE REPLY CARD

Industrial Heater. New 26-page product bulletin describes construction, application, and performance features of Herman Nelson industrial heater. Operation of the heating and ventilating unit is explained in detail. Six pages explain applications and arrangements of the unit. Thirteen performance graphs and charts pertaining to steam capacities, air flow resistance, and other air flow data are included. Also listed are dimension diagrams and tables for all models and arrangements of the heater. *American Air Filter Company, Inc.*

CIRCLE (88) ON THE REPLY CARD

Diaphragm Seals. New bulletin describes diaphragm seals designed to protect pressure instruments against corrosion and clogging. Features include honed metal-to-metal sealing surfaces — no gaskets or O-rings; no internal threads or blind taps; over-range protection to 2500 psig. Units available in various sizes, styles, and materials. *Brooks Rotameter Company.*

CIRCLE (89) ON THE REPLY CARD



Guide for Perplexed Pipe Buyer. Monthly mailings on industrial use of carbon, alloy, and stainless steel rubber products have been inaugurated by Midcontinent Tube Service. First brochure entitled "Inventory" provides up-to-date listings of hard-to-locate pipe and tubing as well as valves, flanges, and fittings. Similar service brochures will be issued every other month, alternating with a news letter entitled, "Pipe Lines" that will detail business and trade news, technical information, progress reports, and other data. No charge to qualified firms. *Midcontinent Tube Service, Inc.*

CIRCLE (90) ON THE REPLY CARD

Sealing Compound. Led-Plate Anti-Seize Sealing Compound has received Underwriters' Laboratories approval covering LP-gases, gasoline, and petroleum oils. Compound will not foul up filters, orifices or other openings. Consists of 70 percent metallic lead in hydrocarbon base and will seal effectively up to 20,000 psi. For studs or bolts, temperature range is from – 100 to 2987 F. *Armite Laboratories.*

CIRCLE (91) ON THE REPLY CARD

Laundry Rating Chart. Up-to-date laundry rating chart designed for use by those who employ the laundry rating method to accurately size automatic gas water heaters, is now available from Ruud. A minimum demand of 30 gallons of hot water an hour has been established in the laundry rating method so that all home needs may be met. Chart lists 34 makes of automatic clothes washers and 294 different models. Hourly hot water demand ranges from 30 to 50 gallons an hour. A total of 188 models require from 30 to 34 gal an hour, 57 models from 35 to 39 gal, 22 models from 40 to 44 gal and 27 models must have 45 or more gal of hot water each hour for consecutive load-after-load operation. Two-color chart is 11 by 35¼ in. Price — 50 cents for each chart. *Ruud Manufacturing Company.*

CIRCLE (92) ON THE REPLY CARD

BOOKSHELF

Refrigeration, Air Conditioning and Cold Storage *by Raymond C. Gunther, published by Chilton Book Division, 56th and Chestnut Streets, Philadelphia 39, Pennsylvania. Pages, 1232. Price, $17.50.*

Practical guide to broad aspects and fine points of every heat extraction process — domestic, commercial, industrial, marine. Discusses in detail treatment and care of water essential in large installations, and methods of combating corrosion of equipment. Gives information on steam jet refrigeration, absorption systems, heat pumps, electric motors, fans, pumps, steam turbines. Book is divided into three sections: The development phase, presenting processes essential to operation and maintenance of the refrigerating system; the production phase studying the refrigeration cycle and presenting the function, design and operation of all apparatus in the system, and the application phase showing how to deal with all processes requiring mechanical heat extraction, and how to install and fix every type of equipment being installed today.

Materials and Methods of Sales Forecasting, *published by the American Management Association, Inc., 1515 Broadway, Times Square, New York 36, New York. Special Report 27. Pages, 239. Price, $5.25.*

New techniques for improving sales forecasting — combining proved data with awareness of significant business and industrial trends — are described in this report. Representatives of Sears, Roebuck & Company, The Ford Motor Company, the Black & Decker Manufacturing Company discuss aspects of sales forecasting, from initial presentation to review of final results. Also discussed are forecasting for a variety of products, planning financial and manufacturing operations based on the sales forecast, and coordinating the market plan with the sales forecast. A section describing information which can be obtained from the government, media, and other published sources as well as a special appendix listing these sources of data are included in this report.

Top Management Decision Simulation, *published by the American Management Association, Inc., 1515 Broadway, Times Square, New York 36, New York. Pages, 126. Price, $4.50.*

This AMA publication offers an original approach to developing skill in reaching sound executive decision by introducing the training technique known as top management decision simulation. Developed by an AMA research team, the technique provides realistic conditions under which a few hours of intensive decision-making simulates years of actual business experience. In this way, the ability to reach accurate decisions quickly is strengthened. The simulation exercise is thoroughly explained. And development of the exercise is discussed: The initial approach to the basic pattern, the major difficulties of construction, the rules and procedures. Publication shows how this training technique can be applied to improve skill in executive decision-making, and examines the technique's prospects for the future.

Research on New Designs for Range Top Burners, Pilots, and Valves, *Bulletin 75, American Gas Association Laboratories, 1032 East 62nd Street, Cleveland 3, Ohio. Price, $2.00.*

Bulletin describes research on new designs of gas burners and ignition systems to reduce bulk and to improve performance of domestic gas range top sections. Design techniques and performance characteristics of a number of small compact single duty experimental burners, related range top components, including burner ignition systems, and closed range top burner installations are discussed.

Reynolds OFFERS A NEW PERFECTED SAFETY CONTROL FOR ALL SERVICE REGULATORS

Reynolds' new Safety Control may be attached to any Reynolds spring type service regulator built in the last fifteen years.

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* **Prevent regulator from falling in a wide open position, thus limiting the amount of gas the safety seal has to pass.**
* **Enable the gas company to set the regulator for a certain demand and if a customer increases that, his outlet pressure would drop which would cause him to call the company and they can find out what his real demands are.**

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Men At Work

IN THE GAS DISTRIBUTION INDUSTRY

● Consolidated Natural Gas Company has announced the retirement of **William A. Dougherty,** chairman of the board of directors and general counsel. **E. H. Tollefson** has been elected to the office of executive vice president and **C. William Cooper** has been named general counsel.

E. H. Tollefson

A. M. Schultz

● **A. M. "Mike" Schultz,** former domestic sales manager of Minneapolis Gas Company, has been appointed manager of sales and service for Quebec Natural Gas Corporation at Montreal.

● Philadelphia Gas Works has announced appointment of **Edward F. Hubbard** as director of administration, to succeed **Howard H. Hessler** who has left active service in anticipation of retirement. **Walter P. Paul** has been named director of industrial relations, the post Hubbard is leaving to assume his new duties.

The SCF "Fence Rider" says

SCF consultants "Ride Fence" for gas companies, nationwide, locating and grading leaks by Vegetation Method, Safety or Combination surveys.

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● **Robert E. Seymour** has been advanced to assistant to the president of The Peoples Natural Gas Company. He will coordinate activities of all departments in preparation of planning and forecasting data.

● **Richard B. Johnson** has been appointed system training director for Consolidated Natural Gas Company.

● **A. A. Halbert** has been appointed vice president of Pitts & Bryant Co., Inc., the recently acquired subsidiary of Arkansas Louisiana Gas Company. Other officers of the utility construction firm are **Lindsey Hatchett**, president; **J. William Trimble,** secretary and treasurer, and **Frank Jones** as general manager.

● **Maurice L. Carlson** has been appointed utilization manager for Southern Union Gas Company. He will head Southern Union's newly formed utilization department which is responsible for coordinating efforts to develop large-scale gas utilization business, including industrial air conditioning, irrigation and similar projects.

● **Lyle McDonald** has retired as chairman of the board of directors of Public Service Electric and Gas Company after forty-two years with the company. He will continue as a director. Upon McDonald's retirement, **Donald C. Luce** as president, will be chief executive officer of the company. **Francis A. Keane,** vice president and a director of the company, has been elected vice president in charge of finance effective upon McDonald's retirement.

● **Frank J. Lydick** has been appointed public relations director of The Peoples Natural Gas Company. Formerly with the information services section of Westinghouse Electric Corporation, Lydick in his new position will be responsible for over-all public and community relations programs of Peoples Gas in Pittsburgh and other western Pennsylvania communities served by the company. **Marion M. Thrash** has been appointed assistant public relations director. He will be in charge of the firm's press relations and publications.

CLASSIFIED

Norco, Incorporated require at their Elkhart, Indiana branch warehouse a field service representative for their new and complete line of gas refrigerators and water heaters.

Excellent opportunity with this rapidly expanding company for an experienced and live wire gas appliance man preferably with some sales background. Selected applicant will be interviewed and attend training school at Los Angeles headquarters. Similar positions available at Chicago, New York, Atlanta, Dallas and Los Angeles. Salary, bonus and expenses. *Send full information in confidence to* **Norman H. Lee, President, Norco, Incorporated,** 5656 W. Washington Blvd., Los Angeles, California.

● **A. W. Beck** has been appointed to the newly-created position of vice president of marketing for Robertshaw-Fulton Controls Company. Beck's department will assist and support marketing activities of the company's six manufacturing divisions. He was formerly sales manager of the Grayson Controls Division.

A. W. Beck

Lindsey Hatchett

W. R. Stephens

D. W. Weir

● **W. R. Stephens** has been elected president of Arkansas Louisiana Gas Company succeeding the late J. C. Hamilton. Stephens has been chairman of the board of Arkansas Louisiana since January 1, 1957, and will continue in that position too. **D. W. Weir** has been elected to the newly-created position of executive vice president and elected to the board of directors of the company. **Lindsey Hatchett** has been elected a new vice president; he previously worked on special assignments for ALG for several years.

● **Donald A. Drake** has been promoted to southwestern district manager for Tube Turns Plastics, Inc. This establishes a full-time district sales office in the Southwest with headquarters in Houston.

● **William H. Cochrane** has been elected president of Neptune Meter Company, succeeding **Dante E. Broggi,** who remains as a consultant to the company. Through its subsidiary, Superior Meter Company, Neptune supplies meters and proving equipment for gas utilities.

● **Dale Josephson** has been named advertising manager of Portland Gas & Coke Company. He was formerly manager of the Oil Heat Institute of Oregon.

● **Donald K. Baarson** has been elected treasurer of Cascade Natural Gas Corporation. He replaces **O. Marshall Jones** who recently was appointed president of Cascade.

● **Donald L. Dowling** has been appointed to the post of engineering consultant of Roots-Connersville Blower Division of Dresser Industries, Inc. He will have offices in the company's New York office.

● Barber-Greene has announced several promotions: **Carl T. Curtis** has been promoted to vice president, Aurora plant manager, **Frank J. Merrill** has been promoted to vice president, DeKalb plant manager, and **W. Alex Greene** to manufacturing coordinator.

Peak Shavings

. . . . with laughing gas

"I guess I've lost another pupil," said the professor as his glass eye rolled down the sink.

Neighbor (finding young bride in tears): "What's wrong dear?" Bride: "I made a cake and put it in the freezer an hour ago and there still isn't any frosting on it."

We judge ourselves by what we are capable of doing; others judge us by what we have done.

Failure is one thing that can be achieved without effort.

Concerning the sexes, here is the snapper: Man is the hunter; Woman is the trapper.

There is far more hunger for love and appreciation in this world than there is hunger for bread.

A raisin is a grape that's had too many worries.

Inflation is just a stab in the buck.

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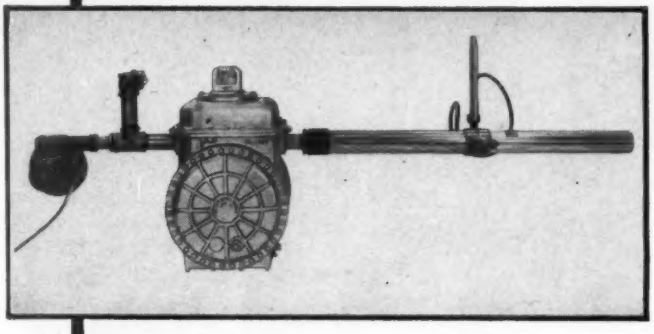

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